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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF [illegible]

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A SCIENCE SERVICE PUBLICATION

MEDICINE

Plastic Tubes Save Lives

Working against thrombosis, plastic tubes are used to determine the time it takes blood to clot. Plastic does not accelerate coagulation, as glass tubes do.

➤ TUBES of "lusteroid," a synthetic plastic, which may be destined for a life-saving role, were introduced to fellow scientists by Dr. Arnold Kadish of the Mayo Clinic at the meeting of the American Association for the Advancement of Science.

The tubes are used to determine coagulation time, or the time it takes blood to clot. They may be valuable for indicating a tendency to thrombosis, Dr. Kadish suggested.

Thrombosis is a condition in which a clot or plug forms in a blood vessel. When it affects an artery of the heart, it is known as coronary thrombosis and is frequently fatal. If doctors could detect a tendency to this condition, they might be able to save thousands of patients by the use of heparin or dicoumarin, two relatively new anti-clotting chemicals. Sudden death from thrombosis a few days after apparently successful operations or childbirths might also be prevented if doctors could tell in advance that the patient had a tendency to the condition.

Coagulation time ordinarily is dedetermined in glass tubes. The glass tubes, Dr. Kadish pointed out, accelerate coagulation thus masking any excessive clotting tendency of the blood when it is in the veins and arteries. Lusteroid tubes have less tendency than glass to accelerate coagulation of the blood.

In studies of 50 patients, he found the normal lusteroid coagulation time to be 14 to 28 minutes in the particular tubes he used. Other tubes have different normal values, so the tubes must be standardized for use.

In nine of 18 patients with arteriosclerosis obliterans, in which the thickening of the artery wall completely closes the lumen or bore of the artery, lusteroid coagulation times were definitely shorter than normal.

Science News Letter, January 4, 1947

GENERAL SCIENCE

Dr. Harlow Shapley Elected 1947 President of AAAS

➤ DR. HARLOW SHAPLEY, director of Harvard College Observatory and president of Science Service, was elected president of the American Association for the Advancement of Science at Boston to serve during 1947 and deliver the retiring presidential address at the 1948 meeting. Inaugurating a new system of naming a president-elect, Dr. Edmund W. Sinnott, Sterling professor of botany at Yale University, was named president-elect to take office at the end of the Chicago meeting which will be held next Christmas holidays.

Dr. George Baitsell, Yale professor of biology and secretary of Sigma Xi and Dr. Kirtley F. Mather, professor of geology at Harvard, were elected members of the AAAS Council for four-year terms.

Science News Letter, January 4, 1947

BIOLOGY

Scientists Report Steps To Harness Chlorophyll

➤ THE FIRST successful step in harnessing the green chlorophyll of leaves to a food manufacturing process that man can control may have been taken in experiments reported to the American Association for the Advancement of Science by Dr. H. C. Eyster of Antioch College, Yellow Springs, Ohio.

So far these new experiments under the Kettering photosynthesis Foundation may seem to non-chemists remote from the prime hope of scientists to beat the living plant at its own exclusive process of capturing sunlight energy and storing it in the form of starch, sugar and cellulose made from water and air.

This is what Dr. Eyster has done: he has succeeded in making chlorophyll dissolved in acetone hang on to bits of talc. This material absorbs the same energy levels of sunlight that the living plant does. If this can be translated to any considerable scale, it might be put to work in factories, making food and other materials we now get from plants. More important, it may be used to store energy from the sun and release mankind from dependence on dwindling supplies of coal and oil which are the fossilized sun power of past ages.

Science News Letter, January 4, 1947

GENERAL SCIENCE

Survival of Man Assured

➤ **SURVIVAL** of mankind for the next **few thousand** years is assured despite any **development** of superplagues, more deadly atomic weapons, fatal boredom born of knowing everything, or dope that might kill the desire to reproduce.

This is the opinion of a leading astronomer, Dr. Harlow Shapley, director of Harvard College Observatory, expressed in his address as retiring president of both the American Astronomical Society and the Society of the Sigma Xi.

Whether civilization will endure is another matter, Dr. Shapley warned.

"The potential shocks in the very near future are indeed ominous," he said. "Civilization is endangered by strong physics and weak sociology. The frightful power of the atomic bomb has suddenly awakened educated people all over the world to the necessity of heroic social action in order to prevent an unheroic physical disaster. Even without the atomic bomb our urban civilization is in great danger, if men and nations do not control themselves."

Technology and pure science can make cultural survival irresistably desirable, Dr. Shapley told the scientists. Science can tempt mankind to minimize localized sovereignties, control national pride when it is obstructive to the maintenance of a world civilization and emphasize the interdependence of national groups. It would be good to experience, a generation hence, a rich world that has not been decivilized by violence hatched from political pride, Dr. Shapley suggested.

"Given time enough, and good intentions," Dr. Shapley said, "the psychologists, the psychiatrists, and anthropologists should be able to explain our social and mental quirks to the world, and teach us how to understand and accept the social and mental traditions of others. Meanwhile we emphasize persistent friendship and tolerance, more correspondence across borders, more travel across the boundaries of nations, more collaboration across the national political lines, until finally the boundaries become worn dim by so much international traffic."

Science News Letter, January 4, 1947

GENERAL SCIENCE

Science Can Feed World

Three-quarters of the earth's chronically starved population can be fed by scientific knowledge, states Dr. C. F. Kettering, noted scientist.

➤ WE HAVE enough scientific knowledge to allow us to nourish properly the three-quarters of the earth's population—1,500,000,000 people—who never get enough to eat, Dr. Charles F. Kettering, General Motors research head, told the American Association for the Advancement of Science in Boston in his retiring presidential address.

"Only 500,000,000 ever get enough of the proper food," Dr. Kettering said. "This is not because of natural limitations. We have the scientific knowledge to provide an adequate diet for everyone if the information were properly applied. The false barriers erected by man himself are responsible. The antiquated social systems, ignorance, stupidity, and fear prevent a large percentage of the peoples of the world from enjoying even the most fundamental of the benefits of science."

Even if it turns out that we do not know enough to feed the world, Dr. Kettering believes that we can turn to the green leaf and learn the principles of how to store the energy of the sun and hold it as food.

"The green leaf is Nature's organic chemical laboratory which takes water from the ground and carbon dioxide from the air to make sugars, starches, and oils," he said. "We know little of the process now, but some day we may be able to reproduce it in the laboratory."

Soil depletion will not stand in the way of food production, Dr. Kettering contended, because "if necessity demands, we can go to our inexhaustible supply of minerals in the sea for all the plant food we will ever need to keep our farm land productive, just as we have gone to the air for our nitrogen."

Where Is Greatest Need?

The war caused a loss of continuity in many fundamental fields of scientific investigation, Dr. Kettering declared. Since we have been forced out of the ruts of past generations, he believes we now have the opportunity to make the future anything we wish. Dr. Kettering called upon the scientists to make a careful analysis of our past to determine where the need for scientific advancement is greatest.

Lithgow Library.

The following excerpts are from Dr. Kettering's address:

New things seemed to spring up overnight. But we know that each miracle was made possible only because of the accumulation of knowledge in the field which comes as a result of our normal, unregimented, peacetime investigations. We must not let the public or the politicians forget this. . . .

The mass-production system is to the scientist and inventor what the printing press is to the writer. . . .

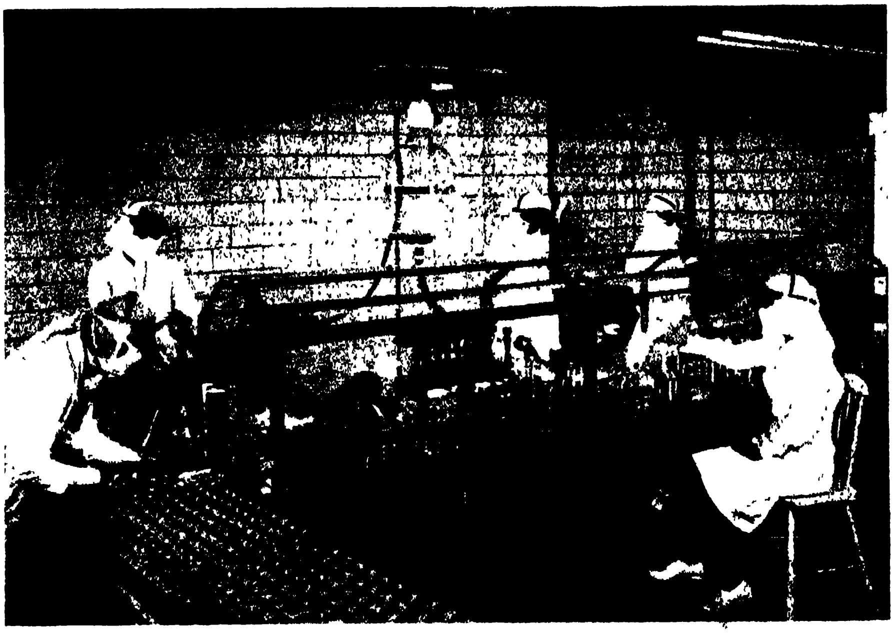
We often hear people express their gratitude for America's natural endowments—its resources of coal, oil, minerals, land, and timber. The backlog of scientific knowledge, our mass-production facilities, our technical societies, and our educational system are rarely considered as resources, yet we know that without them we could never have reached the position we occupy today among the nations of the world. . . .

In the enlightenment of modern times it has been accepted as a matter of course that the pursuit of science by independent research was a worthy endeavor. In our free and independent countries, scientists were encouraged to spend their lives searching for new knowledge. As representatives of this large group of scientists we should resist every attempt to curb the efforts of scientists to find new information. Science must be free. Wherever it has been controlled, it has been only partially productive. In an unsympathetic atmosphere science withers and dies, and all mankind is the loser. . . .

Every place we look in Nature we find problems to be solved. Some can be solved in a short time, while others may take generations. There is nothing in research more important than the time factor. Research must be started years before the results come into general use. Many things, started as much as 100 years ago, have just recently come into use. . . .

Few people understand the difficulties of getting a new idea started. A friend asked me once what is the first requirement of an inventor. My reply was that he must not bruise easily. . . .

The scientists should be open-minded



STERILE FILLING MACHINE—Engineers of the Frederick Stearns & Co., Division, Sterling Drug Inc., have designed and constructed this apparatus for bottling parenamine, amino acid solution, for parenteral injections. The entire filling apparatus is enclosed under plexiglass, and moving bottles are constantly subjected to bacteria-killing ultraviolet rays.

students sitting in the great classrooms of Nature, listening to her lectures, and using this information to benefit their fellow men. We are still in the kindergarten and should not let our present accomplishments prevent us from seeing how little we really do know and what great opportunities there are for advancement. . . .

Life is dependent upon the ability of Nature to use sun energy to convert soda water through the medium of chlorophyll into the foods, fibers, and farm products we need. This is one of the fundamental problems we have yet to solve, and opportunities are as great as man's imagination in this field. . . .

I would like to see some brilliant young student write a thesis on what was chemically available in prebiological time. We do not yet know the elementary principles.

We have learned how to attain salts and bromine from the sea commercially. To obtain millions of pounds of bromine annually from sea water is an important chemical development of the past 25 years. There is one pound of bromine to about eight tons of sea water. What are the chemical reserves of the sea? Each cubic mile of sea water contains 90,000,000 tons of chlorine, 53,000,000 tons of sodium, 5,700,000 tons of magnesium, 4,300,000 tons of sulfur, 3,300,000 tons of potassium, 2,400,000 tons of calcium, 310,000 tons of bromine, and lesser quantities of many other elements, including the trace elements. There are 320,000,000 cubic miles of sea water. Here is a real challenge to future generations to become chemists and engineers of the sea.

Science News Letter, January 4, 1947

GENERAL SCIENCE

'46 Science Well Forecast

A few slips went with the sound predictions made by Science Service at the first of the year. The following is an evaluation of this forecast.

➤ A YEAR AGO--when atomic energy was still a novelty and the war newly ended—you read a Science Service forecast of what would happen in science in 1946 (*See SNL*, Jan. 5, 1946).

You had advance information on many important developments. There were a few slips, of course.

For instance, a National Science Foundation was not authorized by Congress, but it was largely insistence by factions of scientists on details that blocked the legislation in Congress.

A new insect or plant pest entering by air transport was suggested as a possibility, but happily this did not happen.

The first applications of atomic energy for industrial power proved to be considerably slower in coming than was forecast—let' s move that one up to 1948.

Small radio sets using some of the tricks of war developments have likewise been slow in coming.

But there were many good guesses:

The availability of radioisotopes for disease treatment and for research was accurately forecast.

So was the expansion of world air transport systems and experimentation with jets and rockets as an aid to commerical air lines.

"Predictions of radio transmission conditions would be available regularly," and sure enough, newspapers have been carrying them.

"Better chemical treatments for tuberculosis" as foreseen have reached the point where streptomycin is being tested on a wide scale. And the larger commercial production of streptomycin foreseen a year ago allowed its release for general medical use.

Colleges "filled to overflowing with veterans" was an easy guess. There are over two million students, double the previous year's total, and about half of them are veterans.

Explorations foreseen have materialized in the Antarctic expeditions and intensive study of the Pacific areas now underway.

Natural rubber and war-scarce drugs like quinine have returned to the market to a considerable extent, as it was suggested they would.

Further advances in television foreseen materialized in color electronic television and more sensitive pick-ups for working in dimmer light.

Assembled houses and new automobiles have appeared, but not so quickly or on so large scale as was expected before the materials shortages and the work stoppages in industry developed.

Atomic energy control has been a "matter of concern," internationally and within the country, and the progress made within the United Nations and in the U. S. Atomic Energy Commission has begun to determine "whether the world shall have another war in 10 to 25 years."

"Significant steps toward the conquest of important diseases" were made in new chemicals for malaria announced during the year, in the use of nitrogen mustard war gas in treatment of leukemia, the cure of rabbit fever by streptomycin, the cure of anthrax and bovine mastitis by penicillin, a vaccine against rinderpest, the isolation of botulinus toxin in pure form, and many other developments.

The biggest soilless gardening project in the world, covering 80 acres, was

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constructed in Japan, and this fulfilled the expectation that more hydroponics would be used by our occupation troops.

The fulfillment of such expectations of a year ago is the stuff that makes scientific and technical progress.

Science News Letter, January 4, 1947

PARASITOLOGY

Worms Cause Much Woe

Trichinella worm is harbored by one-sixth of Americans. Hookworm and many others, some imported from Asia and Africa, cause serious illnesses.

➤ ONE AMERICAN in every six harbors trichinae, the wicked little worms that may get into us if we eat undercooked pork and bore through our muscles, giving us pains like rheumatism and perhaps even killing us. Most well-raised, well-cured pork is free from these parasites, but the meat of hogs that have been fed on uncooked garbage is very likely to contain them, stated Dr. Norman R. Stoll of the Rockefeller Institute for Medical Research, in the course of his address as retiring president of the American Society of Parasitologists.

The name of the worm, Trichinella, is too pleasant-sounding to arouse people to combat a widespread and menacing infection, Dr. Stoll thinks. To give it a common English title that will carry some of the social stigma that ought to attach to such a pest, he proposes to call it "garbage worm".

Another parasitic worm that is still causing a great deal of illness in this country, despite heroic efforts to wipe it out, is the hookworm. Due to climatic and soil factors, it is confined to certain parts of the South, and unfortunately in just those areas and among just those people where poverty and indifference make it doubly hard to combat. However, its incidence has been greatly reduced; over a 25-year period the number of cases dropped from 4,500,000 to 1,750,000.

There are many other worms that look upon human beings as just so many walking meal-tickets. They are all unpleasant, and some of them are deadly. Dr. Stoll rounded them all up under the general heading of "This Wormy World." Several tropical forms, hitherto of no significance in American life, have come back as stowaways in unwilling ex-service men. What they will do now remains to be seen.

While the worm situation in America tional complacency, we are nevertheless is bad enough, thanks partly to our na- getting off lightly as compared with the poor folks of Asia and Africa. These continents, the speaker said, are the lands of really heavy worm infestation.

Science News Letter, January 4, 1947

SEISMOLOGY

Seawaves Travel at Speed Of Modern Planes

➤ SEA WAVES such as the six that recently devastated the southern coasts of Japan sometimes travel as fast as the swiftest present-day airplanes. Six hundred miles an hour has been calculated for some of them. The deeper the water the faster they travel; shallow water makes them "drag their feet" and slows them down.

Destructive waves of this kind are always started by submarine earthquakes. However, not all such earthquakes start waves. Just what kind of sea bottom disturbance is needed to start one is still a matter of debate among scientists. Many of them hold that a vertical drop or jump of a considerable sector of crustal rock is involved, rather than the grinding sidewise shear and shift of rocks past each other, such as was the cause of the San Francisco earthquake of 1906.

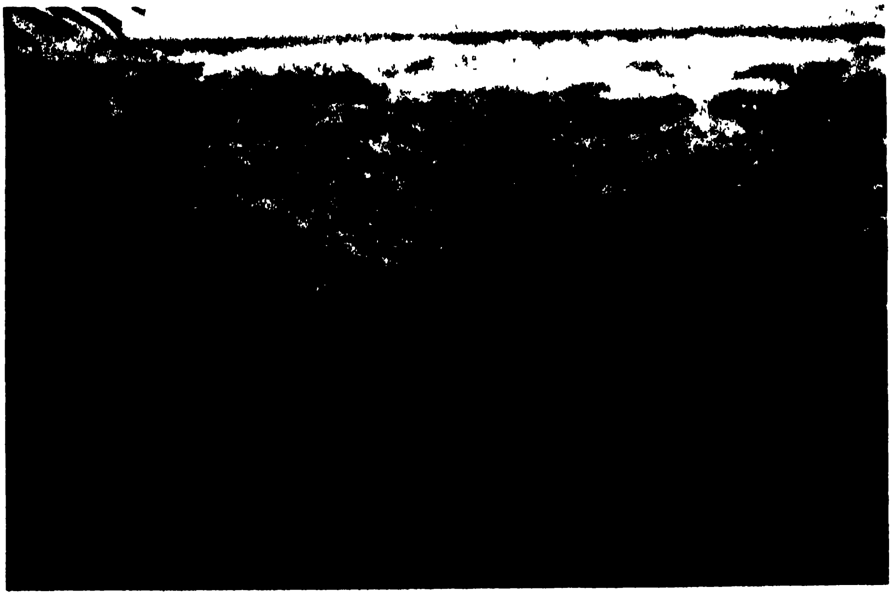
The force of 8.25 reported for the recent Japanese earthquake puts it in a class with the biggest. Only two of that force have been reported in recent years: one in mid-Atlantic in 1941, the other in Peru in 1942. Seismologists of the U. S. Coast and Geodetic Survey are, however, reserving judgment on the claim that this is the worst earthquake in recorded history, at least until more data come in.

They do state that the quake and the sea waves it generated seem to be similar to the disaster that struck Japan in 1943. The extent of damage in that wartime catastrophe will probably never be disclosed by the Japs.

Waves of this kind are familiar enough to the Japanese to be given a special name: "tsunami". There is no good English equivalent. The most frequently-used name, tidal wave, is a misnomer, because these earthquake-generated waves have nothing to do with the tides.

Science News Letter, January 4, 1947

A portable corn dehydrator, to prevent spoilage when corn is cribbed damp, is suitable for use on individual farms.



MONSTER—This is believed to be the only picture ever taken of a seawave. It was taken from an elevation of about 60 feet above sea level on the north coast of the island of Oahu, Hawaii, of the seawave that struck that island April 1.

MEDICINE

New Theory on Cancer

"Plasmagenes," partial replicas of genes in the body, compete with each other for food from the cell substance. This competition might result in cancer.

➤ A NEW theory which may lead to better understanding of cancer and heredity has been developed by Drs. S. Spiegelman and M. D. Kamen of Washington University School of Medicine.

The new conception strikes at the heart of life itself and starts with genes, the hereditary units in the chromosomes within the cells which carry inheritable characteristics. Genes, the scientists suggest, continually produce at different rates partial replicas of themselves. "Plasmagenes" is the name these replicas of genes have been given by another scientist attempting earlier to explain through such a concept certain facts that contradict the classical Mendelian concept of the gene.

An atomic physicist listening to Dr. Kamen report some of the studies leading to this theory likened it to the quantum theory of modern physics.

A report of the new ideas is in the journal, *Science* (Dec. 20).

The chemical nature of these plasmagenes is nucleoprotein, that is, like the protein in the nuclei of cells. The plasmagenes are able, in varying degree, to duplicate or reproduce themselves, according to the theory. Their presence in the cytoplasm of the cells controls the types and amounts of proteins and enzymes synthesized.

Plasmagenes compete with each other for food from the cell substance for survival. The outcome of their competition and the reactions involved would determine the enzymatic make-up of the cell cytoplasm. This being the case, it would be possible to change the result of the competition by varying the conditions under which it takes place. Such changes, if practical methods for accomplishing them can be found, might lead to a method of cancer prevention, though such a result seems remote at present.

Competition among the plasmagenes might result in cancer. This would explain, as is necessary to understanding of the basic problem of cancer, why a sudden heritable change appears in body cells making them into cancer cells. In other words, everyone has plasmagenes that could start cancer as well as genes in the cells of his body tissues all the time. If the cell environment is favorable to the plasmagenes that will develop cancer cells, cancer occurs. If the cell environment is unfavorable to these particular plasmagenes, cancer does not develop.

Science News Letter, January 4, 1947

ASTRONOMY

Stars Are Being Born

Two dozen stars are being born in Sagittarius and will shine millions of years hence. Stars are believed formed from condensed cosmic clouds.

➤ ALMOST two dozen stars that will shine forth millions of years from now are being born in the constellation of Sagittarius, the archer, not far from the center of the Milky Way, Dr. Bart J. Bok of Harvard Observatory told members of the American Astronomical Society at the Harvard Observatory Centennial meeting in Cambridge.

A recent survey of the heavens made by Dr. Bok and Edith F. Reilly of Radcliffe College revealed 23 roundish small, dark nebulae in the region of the diffuse nebula Messier 8. The process of star formation is believed to have progressed farthest in such small, round nebulae, called globules. Globules are sometimes seen in front of star-rich fields and sometimes against the luminous background provided by diffuse nebulae.

Most of these dark nebulae found in the region of Messier 8 are quite small, cosmically speaking, being 930,000,000,000 miles to 3,250,000,000,000 miles in diameter. In other parts of the sky at least 20 more globules have been located, but some of them are as large as 9,300,000,000 miles in diameter. These globules are estimated to have between one-hundredth and one-tenth the mass of the sun.

The globules are believed to have a sufficiently high density to keep them from being disintegrated by the shearing forces of galactic rotation. Through the combined effects of their own gravitational attraction and of external radiation pressure, they will contract to form the beginnings of a star.

How a Star Is Born

The stages by which pre-stellar clouds are built up were outlined by Dr. Lyman Spitzer, Jr., of Yale University, leading American investigator of the interaction between solid particles and gas atoms of interstellar space.

Stars get their start in the world chiefly in the cooler parts of interstellar space, away from the white-hot giant stars. Solid grains are built up, as described by Dr. H. C. van de Hulst, astronomer at Yerkes Observatory, largely of carbon, oxygen and nitrogen; hydrogen and helium probably remain gaseous.

These cosmic grains are gradually molded into clouds by the force of radiation pressure. The clouds condense to form roundish, small dark nebulae. Such a dense cloud, with its mixture of solid particles and gas atoms, contracts as a whole. Individual atoms and dust grains both share in the contraction. Influenced first by radiation pressure alone, then by the combined effect of radiation pressure and the clouds' own gravitational attraction, one or more pre-stellar masses are created.

Science News Letter, January 4, 1947

PHYSICS

Man Has Created His First Snowstorm

See Front Cover

➤ MAN-MADE snow, induced by showering a "supercooled" cloud with dry ice, fell over western Massachusetts recently. Man's snow creation is pictured on the cover of this issue of SCIENCE NEWS LETTER.

The cloud had moisture which was liquid despite the fact that the temperature was below freezing. Dry ice, falling on the cloud, caused submicroscopic bits of ice to appear in the cloud which turned to snow and fell earthward.

Vincent J. Schaefer, scientist in the General Electric Research Laboratory, Schenectady, N. Y., first produced snow in his laboratory. Then he flew above a natural supercooled cloud to create the first artificial snowstorm.

Science News Letter, January 4, 1947

GEOLOGY

Oil On Atlantic Seaboard

➤ OIL MAY yet be found on the Atlantic seaboard. Conditions such as accompany oil pools elsewhere were described for the coastal region of North Carolina and Virginia by Prof. E. Willard Berry of Duke University, speaking before the Geological Society of America in Chicago.

Massive layers of sandstone, shale and other rocks formed from sea-bottom sediments extend downward as much as 15,000 feet in this area, Prof. Berry declared. This is far deeper than has hitherto been supposed to be the case. Drilling may have to go deep, but there is still hope of finding oil.

Dust storms are dreaded and cursed by the Midwestern farmer, yet he makes his living by farming soil laid down as dust in terrific storms that howled across the land some 25,000 years ago. A large part of the best soil in the Corn Belt consists of this wind-blown material, technically known as loess, Dr. M. M. Leighton, state geologist of Illinois, stated.

Before it was dust it was mud, and before it was mud it was solid rock. The ponderous ice mills of the Pleistocene glacial epoch ground the rock into fine silt. When the ice sheet finally began to melt this silt was carried out by rushing streams of water, to be deposited in great outwash sheets. As these dried, wind picked up the fine particles and carried them away, sometimes for hundreds of miles. Something like 160,000 square miles in the central states where the tall corn grows were formed in this manner.

Ol' Man Ribber isn't the near-omnipotent giant that he appears in the popular song. The Mississippi has been shoved around a lot in its long geologic history, Prof. William H. Hobbs of the University of Michigan told the meeting.

Ice did the shoving. The same great glacial sheets that ground up rocks to make the fine soil of Midwestern cornfields slowly pushed across the Mississippi's original channel in three great lobes—and Ol' Man Ribber had to make wide detours. Prof. Hobbs has traced Ice Age channels as far west as Des Moines, Iowa, and Jefferson City, Mo.

Nobody has ever seen any volcanic activity in the neighborhood of the Great Lakes, yet a part of the shore of Lake Superior consists of massive lava flows, Dr. Robert M. Grogan of the Illinois Geological Survey stated. The area he studied extends along the western shore of the lake, from Duluth to the Canadian border, covering nearly 2,000 square miles.

The lavas, which have an aggregate depth of 3,200 feet, poured from fissures in the earth more than a billion years ago, in pre-Cambrian geologic time.

Science News Letter, January 4, 1947

JUST PILLS—Workers making the new antimalarial take dried Aralen crystals from oven for transfer to tablet-making machine in the Winthrop Chemical Co. laboratory.

ASTRONOMY

Solar System Formation

➤ A NEW IDEA of the way in which the solar system was formed from the clashing of two cosmic clouds of gas and dust was offered by Dr. Fred L. Whipple of Harvard College Observatory to the American Astronomical Society meeting.

Promising to explain how great stars other than the sun may have acquired planets of their own, the Whipple theory may also fit the facts of earth history and astrophysics more closely than the nebular and planetesimal theories of solar system formation that have long been favorites.

A sun and accompanying planets would be born of cosmic dust and gas in a relatively short time as the universe counts time. The early stages of the birth process might take some hundreds of millions of years, while the period during which the planets take their shape and get their rotation, might be as little as a few hundred thousand years.

This solves one of the great dilemmas of astronomy and geology, because geology will allow astronomy only two or three billions of years for the age of the earth, and astronomy has heretofore demanded much longer than this to make a solar system out of the chaotic material of the universe.

Here is the way a planetary system like the sun's might evolve according to Dr. Whipple's "cosmic cloud theory": A great cloud of gas, dust and cosmic debris would start to collapse. This cloud would have little or no whirling motion, otherwise it would turn into a double star. The great cloud would collide at an early stage with a smaller cloud containing partially formed planetary bodies, which would be very rare and small in weight.

Then these little planet masses spiral inward, faster and faster, picking up matter and getting bigger and bigger. As they are increased in size, the matter added to them would cause them to rotate in the direction that most of the planets are known to twirl.

The large cloud collapses slowly until the accelerating motion causes "shock waves," exactly the same kind of barrier that modern planes and rockets now strike here on earth in going to supersonic speeds. The collapse of the large cloud is then speeded so that it leaves the planets rotating in their orbits. The main matter of the cloud collapses further to form the sun.

The star-sun itself would likewise have its rotation controlled and fixed by the import of debris and the motions in the collapsing cloud.

If Dr. Whipple's theory is accepted, there need be no more searching for a hidden planet within the orbit of Mercury, which has long been one of the problems of astronomers. He finds that the preservation of a planet closer to the sun than Mercury would be extremely unlikely.

Science News Letter, January 4, 1947

ZOOLOGY

Zoo Answers Its Most-Asked Queries

➤ TO ANSWER some of its most-asked questions, the Lincoln Park Zoo in Chicago started a series of bulletins which are posted in each of the five animal houses.

Here are some of the answers:

Monkeys and dogs both scratch, but the monkeys are scratching for salt, not fleas. Tiny particles of salt on the simian skin are considered tasty by the monkeys.

Cats can see in the daylight and are blind in total darkness.

Opossums are related to kangaroos. Both are marsupials, and the females of both animals carry their young in pouches.

The fastest running animal is the cheetah. Record speed: 70 miles per hour.

Gestation periods for elephants are from 19 to 20 months; giraffes, 14 months; tigers, 120 days; lions, 102 days; opossums, 13 days; dogs, 2 months; mice, 19 days.

Snakes are among the farmers' best friends; they eat mice that eat grain.

Science News Letter, January 4, 1947

ICHTHYOLOGY

Guppies Prove Useful in Tropical Disease Control

➤ GUPPIES, those interesting little fish best known to most of us because of their blithe disregard of birth control, may have a serious job cut out for them in the world's warmer countries. They may be a means of control of parasitic worms known as flukes, that cause the disease known as schistosomiasis—which is even more dreadful than it sounds.

When the flukes are not infesting human beings they live in the bodies of a certain kind of snails, much as malaria germs live in anopheles mosquitoes between rounds. Reduce the snail population and you will reduce the number of schistosomiasis cases.

Here is where the guppy comes in. Dr. Jose Oliver-Gonzalez, of the School of Tropical Medicine, San Jose, P. R., noticed that the snails in certain Puerto Rican areas where the fluke-caused malady had been common were disappearing. He noticed also that there were numerous guppies in the waters where they once had lived.

Brought into the laboratory and put into the same aquaria with the fluke-carrying snails, the little fish eagerly devoured the egg masses that the snails had laid on the glass, on rocks in the water, and even on each other's shells. It looks as if the guppies might be responsible for the disappearance of the snails.

The experiment is being continued on an outdoor scale, by introducing the guppies into waters where snails abound. Close track is being kept of the density of the snail population, to see whether the guppies can be entrusted with a mop-up job on these indirect enemies of mankind.

Science News Letter, January 4, 1947

ANTHROPOLOGY

Research Lowers Opinion Of Early Mayan Culture

➤ THE CARNEGIE Institution's division of historical research, which has specialized on Maya research for three decades, has decided that the Mayan culture was not what it was once thought to have been. The Maya were in many ways the most brilliant exponents of higher aboriginal culture, but research has discovered that, like the ancient Greeks, they built on foundations reared by earlier peoples. Instead of uniquely outstanding leaders in cultural development, the Maya are now considered only one of many groups in both North and South America which were of greater or lesser importance hundreds of years ago.

Science News Letter, January 4, 1947

ARCHAEOLOGY

Expedition to Investigate Lowering of Sea Level

➤ DID PREHISTORIC man walk dryshod across the bed of the Mediterranean from Tangiers to Gibraltar?

Possibility that he did so, at a time when the general sea level was hundreds of feet lower than it is now, will be investigated this spring by a Harvard University expedition headed by Dr. Hugh O'Neill Hencken, curator of European archaeology at the Peabody Museum. This lowering of sea level is thought to have occurred when a large part of the earth's water was locked up in ice during the Pleistocene glacial era.

Skull fragments of Neanderthal man were found in the Caves of Hercules near Tangiers in 1939 by Dr. Carleton S. Coon, also of the Peabody Museum. Research in these caves, curtailed by the war, will be resumed by Dr. Hencken's expedition.

Science News Letter, January 4, 1947

IN SCIEN

MEDICINE

Brain Waves of Sleeping Babies Aid Diagnosis

➤ THE DIFFICULTY of getting brain waves from babies, whose lively arms and legs cause errors in the brain wave records, has been overcome by Drs. T. C. Barnes and Ruth Amoroso, of Hahnemann Medical College and Hospital of Philadelphia.

They simply put the baby to sleep, using an injection (rectally) of pentothal sodium, one of the modern sleeping medicines.

Object of getting the brain waves would be to determine as early in life as possible signs of epilepsy or of brain damage. At the meeting of the American Association for the Advancement of Science, Drs. Barnes and Amoroso reported success in getting brain wave records from babies aged eight months to two years and seven babies between two and one-half and five years. In three-fourths, the records had clinical value.

Science News Letter, January 4, 1947

CHEMISTRY

Dry Air System Prevents Cargo Spoilage

➤ DRY AIR, forced through holds of vessels to protect cargo in transit, has experimentally proved its worth and promises to become standard equipment on many cargo carriers.

Several ships of the Delta Line for South American trade, have just been equipped with a dry-air system known as Cargocaire. It consists of three main components: an air-drying unit, a hold circulating system, and the necessary fans and recording instruments.

The air-drying unit is located near the engine room and uses heat and silica gel to remove the moisture from the air. Under average moist summer conditions, about 75% of the water is taken out. The dried air is then forced through ducts into the holds, and out after circulation by exhaust fans.

The result of this air circulation is that cargo grain does not sweat, bruised fruit decays less, machinery does not rust, and implements and furniture of wood do not warp or become disjointed.

Science News Letter, January 4, 1947

E FIELDS

AERONAUTICS

Man-Made Weather To Test Planes

➤ MAN-MADE weather of the worst type will be available at Wright Field for testing airplane accessories in a new laboratory under construction by the Army Air Forces. When completed, it will be the country's most modern equipment for this purpose.

Articles to be tested include aircraft instruments, deicing and heating devices, ground equipment, electrical systems, generators, motors, power distribution systems, and training equipment.

A system of 10 chambers has been devised for the weather testing. They furnish facilities for studying effects of high altitude, high and low temperatures, humidity and aridity, sun and rain, fungus growth, salt fog, sand and dust.

To test the effects of vibration, an accelerator, or centrifuge, will be installed, claimed to be the largest of its kind ever built. It will be used to test accessories, not pilots, and will be equipped with television to make constant observation possible.

Science News Letter, January 4, 1947

METALLURGY

Properties of Steel Vary With Iron Carbide Content

➤ THE PROPERTIES of a steel may vary depending upon whether such alloying metals as manganese, chromium, molybdenum or tungsten are in the metallic iron itself or in the iron carbide that forms within the steel, Dr. J. B. Austin, U. S. Steel Corporation, reported to the American Society for Metals in Atlantic City.

This iron carbide is often known as cementite, a name given it by early scientists who believed erroneously that the carbide forms a cement that holds the metal grains together.

Iron carbide, he stated, is represented by a chemical formula that shows it to be composed of three atoms of iron to one of carbon. Recent X-ray studies show that the proportion may vary. At high temperature there may be less carbon. From non-conclusive evidence, some of the carbon atoms may be replaced with nitrogen. The iron may be replaced by the alloying elements. Indeed, he said, when manganese, chromium, molybdenum or tungsten are present in steel, they tend to concentrate in the cementite.

The hardness of the carbide and its resistance to etching depend upon how much alloying element it contains. Thermal expansion, electrical resistivity, magnetic quality and sometimes corrosion resistance of the steel may be affected.

A new one-kilowatt electronic power generator for brazing and soldering in small and medium-sized operations was demonstrated at the National Metal Congress exposition. By use of this induction heating equipment, production is four times as great as with older methods. It is a development of the Radio Corporation of America.

The set-up includes a conveyor belt which carries radio condenser cans and base-assemblies, each with a preformed ring of solder previously inserted, through the field of an induction coil. High-frequency power from the new generator is fed to the coil at controlled intervals. The induced currents in the condenser cans generate enough heat to melt and flow the solder uniformly at the junction of the base and can.

Science News Letter, January 4, 1947

MEDICINE

Experiment Shows How Nerves Act as Batteries

➤ A TEST-TUBE demonstration of how nerves act as electric batteries was presented before members of the American Association for the Advancement of Science by Dr. T. C. Barnes of Hahnemann Medical College. Into a test-tube containing salt solution and an oil solution of the nerve-chemical, cholesterol, he introduced a small quantity of a compound known as acetylcholine, which is released by nerves in action. The resistance of the oil to the passage of an electric current immediately dropped to little more than one eighth of its initial value.

"This test tube model of living nervous electricity," Dr. Barnes stated, "helps us to understand the cause of epileptic fits, which are produced by high-voltage rapid waves in the brain. Convulsions are probably produced by excess acetylcholine in the brain. This excess acetylcholine generates the excess electrical potential that spreads to the nerves in the limbs giving convulsions. The enzyme called choline esterase is the janitor of the nervous system that removes waste acetylcholine not needed for normal nerve electricity."

Science News Letter, January 4, 1947

MEDICINE

Curare Is Hard to Make By Impure Native Methods

➤ CURARE, deadly Indian arrow poison that has come to be an exceedingly useful drug, is still in a pretty badly "messed-up" condition because of traditional native methods of making the crude extract from the South American plant that secretes it, Dr. D. L. Tabern of the Abbot Laboratories, North Chicago, told members of the American Chemical Society.

Said Dr. Tabern: "The native is no expert botanist, and he usually—perhaps to increase the magic of his brew—insists on using a number of different plants, and may toss in a few small animals for good measure, and there is not much the chemist here in the States can do to convince him of the error of his ways. It is quite probable, too, that the type of alkaloids present in any given species of plant will vary with the conditions of growth—the net result being that each lot presents a problem all its own."

For this reason, chemists in this country are hard at work in an effort to prepare curare in as nearly pure form as possible.

Curare, which in large doses causes fatal paralysis by severing communications between nerve and muscle, merely produces surgically desirable relaxation when administered in safely minute concentrations.

Science News Letter, January 4, 1947

PUBLIC HEALTH

Graduate Fellowships In Public Health

➤ FELLOWSHIPS for post-graduate training in public health are available for the school year beginning next fall from a grant of $228,400 made by the National Foundation for Infantile Paralysis, Surgeon General Thomas Parran of the U. S. Public Health Service has announced.

The fellowship funds come from contributions to the National Foundation for Infantile Paralysis March of Dimes drive. Fifty-three students were awarded fellowships beginning last fall.

Fellowships provide an academic year of graduate training in an accredited school of public health or school of sanitary engineering. Applications for the fellowships will be received until May 1, 1947.

Science News Letter, January 4, 1947

GENERAL SCIENCE

Science Previews for 1947

Use of radioactive isotope 14 of carbon may lead to cancer control; supersonic air travel may become reality; many research projects will be completed.

By WATSON DAVIS

➤ LIST these long shots for scientific achievement in 1947.

Discovery of the secret of photosynthesis—how the green leaf converts sunshine into energy we can eat and use.

Demonstration of the possible control and prevention of some kinds of cancer based on better understanding of the mechanism of the disease.

These discoveries will be indirect consequences of the release of atomic energy if they come as the result of the use of radioactive isotope 14 of carbon used as a tracer element in experiments upon the two great problems.

Here are other possibilities in science for the new year:

Photographing of starlight never captured before, the part of the stellar spectrum cut off by the ozone layer high in the earth's upper atmosphere. These valuable pictures would be made from V-2 rockets.

New methods of weather forecasting will be pioneered through use of electronic computer techniques for speedily solving complex meteorological equations.

The giant 200-inch telescope, world's largest, on Mt. Palomar, Calif., will at last be completed and get into operation, capturing evidence of great galaxies or other universes so distant that light takes close to a billion years to travel to us (at 186,000 miles per second!).

The discovery of a chemical element—perhaps even two or three—heavier than curium, number 96, now the heaviest man-made transuranium element resulting from atomic bomb research.

Operation experimentally of the first atomic energy power plant in its pilot stage, still a long way from a practical power producer threatening coal and oil.

More knowledge of the barrier to speed of travel through air at about the speed of sound, and possible conquest of this shock wave area by an experimental supersonic airplane.

OAK RIDGE—Lead bricks absorb radiations from the material in the beaker, in this laboratory at Oak Ridge, Tenn. The chemist watches his work in the mirror and handles the apparatus with a relatively short pair of tongs. Equipment of this type is used in the production of radioactive materials.

The first jet-propelled transport plane may take to the air.

Instrument "push button" landings for airplanes will probably come into limited commercial transport use.

Such positive research achievements are in many respects safer to forecast than what will happen in the organization and financial support of scientific research.

The establishment of a National Science Foundation for federal support of research on an adequate scale is about a year overdue. Congressional action failed because of a schism among scientists over methods of organization. Whether the scientists will get together, and whether a Republican congress will enact the necessary legislation, remains to be seen.

A rising conflict between military and civilian science and research may cloud the situation. When war-time research was terminated by the Office of Scientific Research and Development, military branches of the government, particularly the Navy, used existing funds to support fuundamental, as well as applied, research in universities and other laboratories. This saved many researches that would otherwise have stopped. But it also gave the military an upperhand in the planning of research, which some scientists fear.

Civilian Atomic Control

The civilian Atomic Energy Commission during 1947 will gradually take over nuclear research for peaceful and war purposes, continuing the broad fundamental development that was the most spectacular science push of the war.

Less will be said about the continuing work on biological warfare, but in great secrecy experimentation and development will continue on germs, toxins and other disease-producing agents. New cures of dread diseases are likely to result, just as during the war ways of countering some of the worst biologic poisons, such as botulinus toxins, were discovered.

America's largest tests of one weapon against tuberculosis, the BCG vaccine used for over two decades in Europe, will be made in 1947 and you may expect some clinical results from tests of some of the new antibiotics upon this disease.

In the field of endocrinology there will be continued exploration of the intricate relationship between various glands of the body. There should be substantial progress in connection with the interplay between the hypothalamus and the anterior pituitary, one of the fundamentals in gland control.

Because our population has more older people in it, due to medical science's lengthening of the life span, you will hear more about forestalling and alleviating the disabilities of persons past maturity. Gerontology, the science of old age, will be more widely known.

New Mineral Riches

Don't be surprised if there are discoveries of importance of new mineral riches within the earth and within reach of man. One promising field of study is the radioactivity of oil field waters and strata, and there seems to be hope that other methods of geological exploration may find rich ores, even bonanza deposits of metals needed by our industries.

From the expeditions that for military reasons are probing the arctic and the antarctic there will come geographical and mineralogical discoveries of importance.

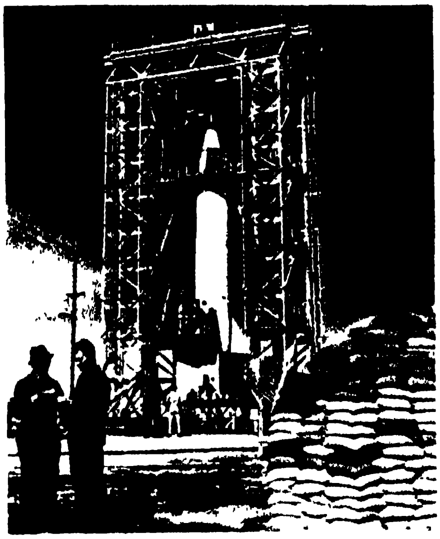
First on the search lists of geologists are the ores of uranium and thorium, the elements from which atomic bombs can be made. Whether any more really rich deposits will be found and in what nation they will be located; these are great question marks for the future.

Watch for radar in aviation. Light sets, suitable for installation in transports as an anti-collision device, will be ready for use, and very light sets for private planes may be ready. Ground radar at airports, to talk pilots down in overcast, are promised that will require only one operator instead of the six needed with the war-developed Ground Control Approach device.

Color Television Perfected

All-electronic color television, now experimentally successful in laboratory demonstrations, will be perfected and made ready for mass production for the public. It is a complete departure from television in mechanical color which has been shown in various forms during the past few years.

Coal-burning gas turbine locomotives, with internal combustion engines fed with finely divided coal powder instead of diesel oil, will be designed. A gas turbine engine using this atomized coal has completed a year's test and proved the principle. The first applications are planned for locomotives.



UPPER ATMOSPHERE RESEARCH—A German rocket specialist assists in preparing a V-2 for firing at the Army Ordnance Proving Ground at White Sands, N. Mex., in connection with rocket and aviation research.

Behind the wall of military secrecy there is intensive work on rockets and other guided missiles for fighting any war of the future. Because this is military research, there will be few, if any, announcements as results are obtained, but in 1948 if not in the coming year, rockets rising farther from the earth than the hundred-mile record of the V-2 may be expected.

Defense Against Rockets

One of the major problems in atomic age defense is some method of shooting down supersonic rockets once they are launched, something that could not be done in the Nazi attacks with the V-2. This will be a prime job for Army and Navy scientists for 1947.

There will be a continuing search for knowledge of the cosmic rays that bombard our atmosphere from outer space. Rockets and high-altitude planes will gather more information about this radiation, with some chance that the observations will help explain the composition of the atomic nucleus, and the kinds of really fundamental particles in nature.

Astronomers from all over the world will travel to South America and Africa to see the total solar eclipse on May 20. Simultaneous observations taken from the two coasts may extend our knowledge of the sun and of the earth itself.

Notable advances in pesticides can be expected. These chemicals that kill insects, rodents, weeds, etc., without material harm to man and the things he cherishes are only now being freed from their shackles of wartime secrecy, and further research is still needed to make some of them safer.

Some variant of DDT that will kill mosquitoes without killing fish in the waters where they breed can be looked for soon. The weed-killer, 2,4-D, has more than a thousand chemical relatives, many of which have yet to be tested; some of these may prove better than the compound first marketed.

Soil fumigants, that clean out destructive little worms known as nematodes, have made only a relatively small start; great extension of their use can be expected during 1947. Perhaps other fumigants can be found that will kill such soil-dwelling pests as wireworms, white grubs and Japanese beetle larvae.

Extension of the already successful artificial insemination technique to include the artificial implantation of pre-fertilized ova in the bodies of foster-mother animals may be announced. Steps leading in this direction have already been taken, and the goal of producing blooded livestock out of the bodies of unpedigreed animals is not too

(*Turn to page 12*)

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Do You Know?

Over half America's supply of *electric power* is produced by coal-burning equipment.

Vicuna coats, that may cost $1,000, are made from wool clipped from the massive beard on the Peruvian vicuna's chest.

Milk, long regarded as good for teeth because of high calcium content, also helps prevent decay, it is now claimed.

The *Thunderjet* (Army P-84) is the first American jet fighter to exceed 600 miles per hour in speed; its record is 611 miles an hour.

Scientists of the University of California report the finding of *skeletons* of men who lived in the Sacramento delta region 4,000 to 8,000 years ago.

The Humboldt ocean *current*, that passes along the western coast of South America from the south, is responsible for the cool climate of the coastal area.

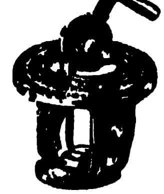
Bristles for brushes can be made from casein by a new process developed by the U. S. Department of Agriculture; casein is obtainable in large quantities from waste skim milk.

British Honduras' former famous *sponge* industry is now near death because of a fungus that invaded the sponge-planting grounds in 1939 and wiped out all live commercial sponges.

The mightiest *dam* in the southern hemisphere will soon be constructed in Australia only 70 miles from Sydney in the Warragamba gorge; it will be 380 feet high but only 250 feet long.

Science News Letter, January 4, 1947

OBSERVOSCOPE STAR FINDER



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From Page 11

far off. When it is reached, it will mean as great a revolution in animal industry as the introduction of hybrid corn was in grain production.

The world's biggest soilless gardens, with a total area of 80 acres, will come into production in Japan during the spring of 1947. While their produce will be used exclusively by American occupation forces, these gardens are being eagerly studied by Japanese agriculturists and plant scientists, who see in them the possibility of supplementing Japan's meager food-producing acreage by setting up similar installations on the rocky, uncultivated slopes of the islands.

Science News Letter, January 4, 1947

GENERAL SCIENCE

New Freedoms For Science

➤ TO THE four freedoms that were the Allies' pillars of fire in the night of war, Dr. E. F. Degering of Purdue University added three more in his address before the chemical section of the National Association for the Advancement of Science in Boston. As he defined them, they are freedom of economic enterprise, freedom from prejudice, and freedom for research.

Freedom of economic enterprise he considers threatened by too much planning from above. Freedom from prejudice is something within the command of the individual; the speaker confessed to having violated it, at his own cost, on some occasions when he made up his mind in advance what the results of an experiment were going to be. When he went into the laboratory with a free mind he achieved results of real value. For freedom for research ample material means are necessary, he pointed out, hailing present research support by the Navy and the prospective establishment of a well-funded research program by the Congress as important steps in this direction.

Under the Navy's free-handed support of research, nearly 300 contracts with scientific institutions have already gone into effect, Vice Adm. Harold G. Bowen, in charge of the Navy's research program, told the meeting. He made it clear that there are no strings tied to any of these grants, and that no special institution or group is being favored.

"Any college or university, large or small, anywhere in the United States, is free to propose a research project to the Navy," he said. "In addition to meeting the requirements of naval applicability, the proposer must have the necessary personnel and facilities to conduct the task."

In a companion report, Maj. Gen. Curtis E. LeMay stressed the importance of active research in aeronautics for the national defense. With most of the world's industrial capacity crowded into areas within easy reach of each other by transpolar flight, our frontier now lies across the arctic wastes, he emphasized.

If war comes again, Gen. LeMay continued, the United States will be attacked first: "Twice in our lifetime we have been the principal factor in the defeat of the aggressor nation. The lesson is too plain for anyone to overlook. . . . The war will start with bombs and guided missiles falling on the United States."

To face this unpleasant fact with readiness for prompt action, the Air Forces have taken steps, a highly important one being the establishment of an office responsible for research and development. Coordinated with this will be an advisory board on which 30 civilian scientists and engineers will sit with military men, to give the Air Forces full information and advantage of new developments in all its fields of activity.

Science News Letter, January 4, 1947

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ASTRONOMY

Sun Broadcasts to Earth

The sun sends up radio antennae in the form of thread-like prominences. These radiations affect greatly our radio reception and television.

➤ THE SUN sends up its own radio antennae for broadcasting to the earth.

Radar bearings of the sun indicate that the newly discovered radio noise is definitely of solar origin. The antennae used in broadcasting are the long, thread-like prominence filaments that surge into coronal regions, Dr. Donald H. Menzel of Harvard University told members of the American Astronomical Society at the Harvard Observatory Centennial in Cambridge.

"Just as a lamp with a long filament radiates more energy than one with a short filament, these prominence threads emit far more radio energy than does the solar surface," Dr. Menzel reported during the symposium on the gaseous envelope of the earth.

The sun's envelope was pictured as a sort of ionosphere like that surrounding the earth. It retains all electromagnetic waves below a certain frequency. Such radiations do not get through the solar gases as well as do the light waves.

The greatest portion of the noise blasts from the sun, picked up on radar and television, have been found to come from active sunspot regions rather than from the entire surface. The total area of the long, thread-like prominences may be many thousands of times greater than that of the spherical solar surface, the Harvard astronomer stated.

Streamers of gas bubbling up from the sun's interior were pictured by Dr. Leo Goldberg, director of the Observatory of the University of Michigan, in an effort to explain the fact that the corona, pearly halo that makes total solar eclipses so spectacular, is 100 times hotter than the surface of the sun.

These streamers, perhaps as hot as 1,000,000 degrees Centigrade, gradually cool and produce various forms of coronal and prominence streamers, Dr. Goldberg stated in reporting one theory reached by himself and Dr. Menzel in a joint research.

Cosmic eruptions resembling those of the atomic bomb, complete to the mushroom cap but infinitely larger, were shown in a series of motion pictures taken at Climax, Colo. Dr. Walter O. Roberts, superintendent of the High Altitute Observatory of Harvard University and University of Colorado, presented another set of pictures depicting the eruptive arch of last July 4, the greatest ever recorded. It was almost as large as the sun itself.

The sun is not only the direct or indirect source of all our power, light and heat, but it and its variations affect magnetic compasses, radio communications, power and transmission lines.

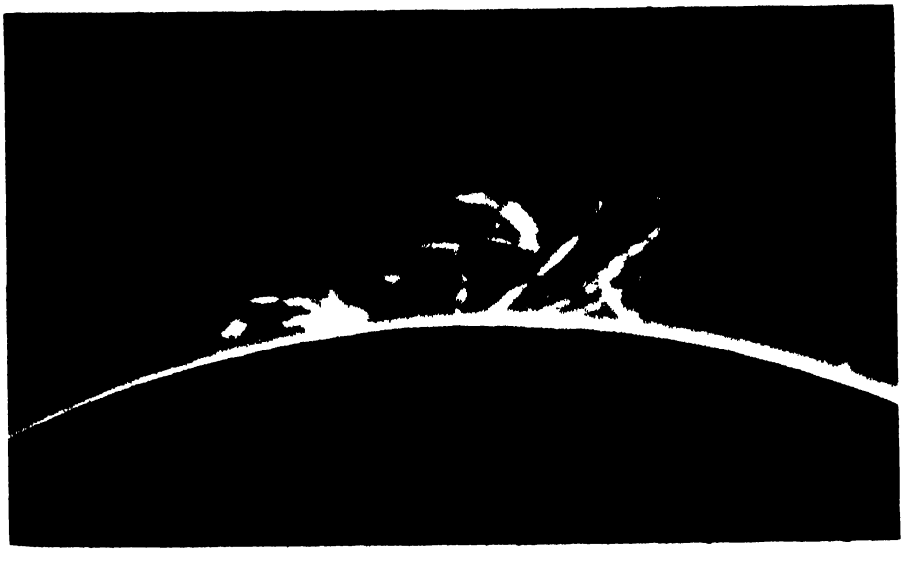
"From a study of the sun's profile," Dr. Roberts stated, "we at Climax have discovered that magnetic disturbances usually occur three to seven days after brilliant areas of coronal emission have appeared at the east limb of the sun."

Radio reception in turn is strongly influenced by magnetic upsets.

The hope that further studies of solar activity would directly benefit those concerned with radio communications problems was expressed by Dr. Joseph H. Dellinger, chief of the Central Radio Propagation Laboratory of the National Bureau of Standards.

A better understanding of how changes in solar radiation affect the earth's gaseous envelope would improve radio communications and make air traver safer.

Electrified layers located 70 to 250



SUN'S ANTENNAE—The long thread-like prominence filaments seen in this picture of the sun's prominence taken at the High Altitude Observatory of Harvard College and the University of Colorado at Climax, Colo., help in beaming radio waves to the earth.

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miles above the surface of the earth are responsible for long-distance radio communication. The electrification changes not only with the daily and seasonal position of the sun, but also with the conditions of solar activity. Studies are now underway to discover just what influence the sun and even other stars have on the ionosphere, the frontier of our planet.

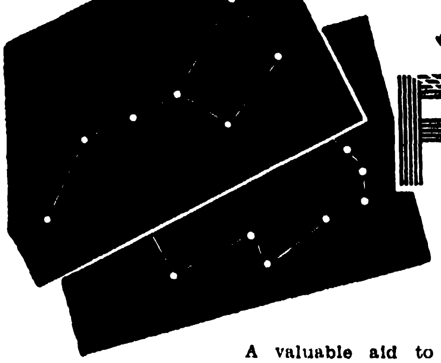
Accurate weather forecasts several months in advance may result from further study of the relation between the weather and solar activity, Dr. B. Haurwitz of the Massachusetts Institute of Technology stated.

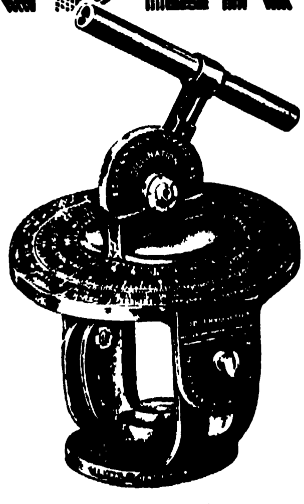
A small change of solar energy may result in a marked change of weather. Dr. Haurwitz explained that the effects of variation upon weather occur through the medium of the so-called ozone layer.

From 12 to 25 miles above the earth's surface we find a layer of this peculiar compound of oxygen, highly absorbing in the ultraviolet region. Small changes of solar activity could cause the temperature of this region to rise or fall 50 degrees Centigrade.

The temperature increase, however, would not be uniform. Where the sun is near or below the horizon the increase will be smallest or even non existent. This lack of uniform heating will set the air in motion, disturbing the equilibrium of the entire atmosphere. Air movements in the lower levels would thus be initiated.

Science News Letter, January 4, 1947





STAR FINDER

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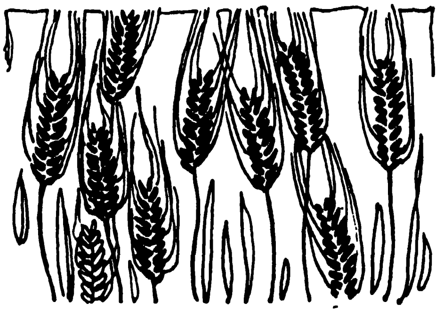
CLIMATOLOGY

NATURE RAMBLINGS

by Frank Thone



Frozen Blessings

➤ SNOW AND ICE and piercing cold winds are little liked by the generation who are past the age of skating and skiing. With their minds on solid and practical things like making money and enjoying a good dinner, they are apt to shudder at the mere thought of freezing weather, and to reach for travel folders decorated with pictures of palm trees and bathing beauties.

Which is really a most ungrateful performance. That money, and those meals, are the gifts of the cold, to an extent greater than they realize. If you want a rough index of what all this is about, compare the number of persons you know who can spare cash to go south for the winter with the number whose permanent homes are in the South and who can afford to go north for the summer. Prosperity and winter cold are close companions.

If you want to probe a little further, and can get at a really good map collection, just try comparing maps showing per-capita wealth by states, or car loadings, or volume of manufactures, with a map showing the southern limit of snow on the ground on March 1. Or a map showing average farm land prices with the area covered by the glacial mantle of the Pleistocene ice age.

There is more than coincidence in this concentration of wealth where there is at times a lack of warmth. Snow on the ground through the coldest 10 to 15 weeks of the year means good protection for fall-sown grains, and immediate moisture available when spring warm-up stimulates them to new growth. Deep frost means a working and turning of the soil because of the expansion and contraction of ice in it: old Boreas is a first-class plowman. A million years of glaciation means deep, rich soil where that slow, long grinding took place.

This does not mean that there are no areas of good, productive, wealth-making soil outside the regions that have to endure an annual attack of frostbite. There are such premium spots as the Sacramento valley, the Louisiana canefields and the Lake Okeechobee shores in this country, for example, and similar choice bits elsewhere. But if you want deep, rich, black soil that stretches out endlessly, for thousands of square miles, you have to go where the ice once groaned, in the upper Mississippi valley and around the Great Lakes.

Science News Letter, January 4, 1947

Books of the Week

AGING SUCCESSFULLY—George Lawton—*Columbia,* 266 p., $2.75. How to enjoy a rich, constructive life as you grow older. A book for everyone who will ever be 60, and for everyone who is, or has been, 60.

COMMUNITY CENTERS AS LIVING WAR MEMORIALS: A Selected Bibliography with Interpretative Comments—Compiled by James Dahir—*Russell Sage Foundation,* 63 p., paper, 50 cents.

ELEMENTS OF GENETICS—Edward C. Colin—*Blakiston,* 402 p., illus., $3.50. A textbook for college students which gives special emphasis upon the application of the principles of the Mendelian theory of heredity to man and the roles played by heredity and environment in man.

GUIDE TO SOUTHERN TREES—E. S. and J. G. Harrar—*McGraw-Hill,* 712 p., illus., $4.50. This book describes more than 350 species of trees native to the southern states. Included are notes of interest and historical significance pertaining to many of the trees described.

JANE'S ALL THE WORLD'S AIRCRAFT 1945-1946—Compiled and edited by Leonard Bridgman—*Macmillan,* 652 p., illus. $19. A book which gives the record of recent aeronautical progress throughout the world. Facts are given about all the important British and American combat planes, and extensive, detailed information on German and Japanese aircraft and aero-engines.

MATHEMATICS IN LIFE: Basic Course—Raleigh Schorling and John Clark—*World Book,* 500 p., illus., $1.80. A high school textbook written to develop a broad and dependable mathematical competence for our citizens. The subject matter bridges the gap in mathematical preparation that was discovered during the training of men and women in the armed forces in World War II.

OIL FOR VICTORY: The Story of Petroleum in War and Peace—by the Editors of *Look*—*McGraw-Hill,* 287 p., illus., $3.50. This is essentially a story of people—of an unsung task force who, by incredible labor and ingenuity, supplied the second World War's most vital munition, petroleum.

PRECISION HOLE LOCATION: For Interchangeability in Toolmaking and Production—J. Robert Moore—*Moore Special Tool Co.,* 448 p., illus, $5. A review of all hole-location practices and their evolution to the point where the toolmaker can now employ engineered methods and apply the principle of interchangeability to his own operations.

PROTECTION OF CROPS FROM FROST DAMAGE THROUGH THE USE OF RADIANT ENERGY—A. W. Farrall, W. H. Sheldon, and C. Hansen—*Michigan State College,* 10 p., illus., paper, free.

RARER METALS—Jack DeMent and H. C. Dake—*Chemical Pub. Co.,* 432 p., illus, $7.50. A book in which the mineralogy, chemistry, physics and technology of the less familiar elements are described. It is suitable as a reference text or for supplementary reading in science and engineering courses.

THE SECOND FORTY YEARS—Edward J Stieglitz, M. D.—*Lippincott,* 317 p., illus., $2.95. A book that tells how to grow old successfully, through a sound, scientific program for making the years after forty happy and fruitful.

SPINOZA: Portrait of a Spiritual Hero—Rudolf Kayser, with an introduction by Albert Einstein—*Philosophical Library,* 326 p., $3.75. The story of the life of Baruch Spinoza, based on all available documents about his life and era.

THE SULFURIZATION OF UNSATURATED COMPOUNDS—Harry Westlake, Jr—*Mellon Institute,* 20 p., paper, free.

SULFUR & SULPHIDES VS. MATERIALS OF CHEMICAL PLANT CONSTRUCTION——James West—*Mellon Institute,* 4 p., paper, free.

SURGICAL TREATMENT OF THE SOFT TISSUES—Frederick W. Blancroft, ed.—*Lippincott,* 520 p., illus., $15. Twenty-one leaders in the surgical world have contributed to this compilation of surgical treatments. It is assumed that the diagnosis has been made when the book is consulted.

THIS IS THE MOON—Marion B. Cothren—*Coward-McCann,* 87 p., illus., $2. An up-to-the-minute account of the moon that reads like a story but is scientifically accurate; a fascinating book for boys and girls.

TUTORING AS THERAPY—Grace Arthur—*Commonwealth Fund,* 125 p., $1.50. An analysis of each phase of the tutoring problem, showing the role of the psychologist in diagnosing the difficulty, suggesting the teaching method and checking the progress of the work.

Science News Letter, January 4, 1947

ENGINEERING

Wood Gives Up More Charcoal in New Process

➤ MORE CHARCOAL is obtained from wood, also more acetic acid and methanol, by a new process described to the Northwestern Wood Utilization Council by Robert S. Aries of the Polytechnic Institute of Brooklyn where it was developed.

One ton of dry wood, under the new process, yields 1000 pounds of charcoal, 125 pounds of acetic acid, and 80 pounds of methanol. This is roughly two-thirds more than obtained by present oven methods.

The Institute's new method employs a steel chamber into which the wood is fed at the top and emerges as charcoal at the bottom. Flue gases are circulated several times in the chamber, thus drying the wood and saving on the amount of heat necessary for carbonization. In the ordinary process, wood is loaded by hand onto cast iron cars and run into a heated kiln.

Commercial charcoal makers ordinarily cannot operate economically without an income from the by-products including acetic acid and methanol. These essential chemicals can now be made synthetically. The larger yields by the new process will help the charcoal producers.

Science News Letter, January 4, 1947

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• New Machines and Gadgets •

✿ *RIVET hand gun is highly practical for use in installing large blind rivets where the quantity of rivets to be installed is small or in the field where air pressure is not available. It operates manually on the ratchet principle, and is about 29 inches long.*

Science News Letter, January 4, 1947

✿ *LOCKING ADHESIVE, glued in two strips to the bottom of boxes and packages in freight cars, keeps them from sliding around en route. It has a high shear strength to prevent shifting, but can be broken by a sharp upward blow of the hand to release a container.*

Science News Letter, January 4, 1947

✿ *PLASTIC ADHESIVE may be suitable to glue airplane sheet metal parts together instead of rivets. Recent laboratory tests with pieces of 1/16-inch duraluminum cemented together with the adhesive show the joint stronger than the metal itself under bending tests.*

Science News Letter, January 4, 1947

✿ *SCRUB WATER pick-up, recently patented, is a large dustpan-like device with a trough container extending along its rear. When its front straight edge is against the floor, the water can be swept up the inclined face into the trough and carried to the drainpipe.*

Science News Letter, January 4, 1947

✿ *ELECTRONIC TUBE used on a small-sized hearing aid is three-quarters of an inch long. Three of these tubes, one of which is shown in the picture, are employed. The instrument can be used for moderate amplification, or can be converted to standard amplification.*

Science News Letter, January 4, 1947

✿ *DISH-WASHER, operated by the normal pressure of the water system in the home, has eight jets that reach the surface of every dish in the tray and spin the tray itself. Only two outside connections are required, one with the hot water system, the other with the drainpipe.*

Science News Letter, January 4, 1947

✿ *HEMOGLOBIN content of blood is quickly measured by studying its color intensity. A sample of the patient's blood, treated with a hemolyzing agent, is placed within a pocket-size instrument where its light-transmitting characteristics are compared with glass wedges of known transmission properties.*

Science News Letter, January 4, 1947

✿ *PLASTIC VISORS for automobiles, smoky green in color, are hinged across the front of the car and can be turned down over part of the windshield to lessen glare from road or sky. There is a two-shield model, with shields of different widths; the wider one cuts road glare, the other eliminates sky glare.*

Science News Letter, January 4, 1947

✿ *WARNING INSTRUMENT, for use in the manufacture of explosives, sounds an alarm when excessive temperature or pressure is reached.*

Science News Letter, January 4, 1947

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Question Box

ASTRONOMY

Do radiations from the sun affect our radio reception? p. 13.

How is a star believed to be "born"? p. 6

BIOLOGY

In what part of the United States is hookworm most prevalent? p. 5.

What is being done to harness chlorophyll? p. 2.

CLIMATOLOGY

In what way are prosperity and cold weather tied together? p. 14.

GEOLOGY

Why should mid-western farmers be thankful for ancient duststorms? p. 7.

GENERAL SCIENCE

How may science provide relief for the earth's chronically starved population? p. 8.

What dread disease may be controlled by results of nuclear research? p. 10.

MEDICINE

How do doctors get satisfactory brain waves from babies to aid in diagnosis? p. 8.

How will lives be saved from thrombosis? p. 2.

PHYSICS

How did man make his first snow storm? p. 6.

PUBLIC HEALTH

What organization provides graduate fellowships for study in public health? p. 9.

SEISMOLOGY

What is the Japanese name for the dreadful seawaves that so often sweep their islands? p. 5.

ZOOLOGY

Are opossums related to kangaroos, and in what ways are they alike? p. 8.

Where published sources are used they are cited.

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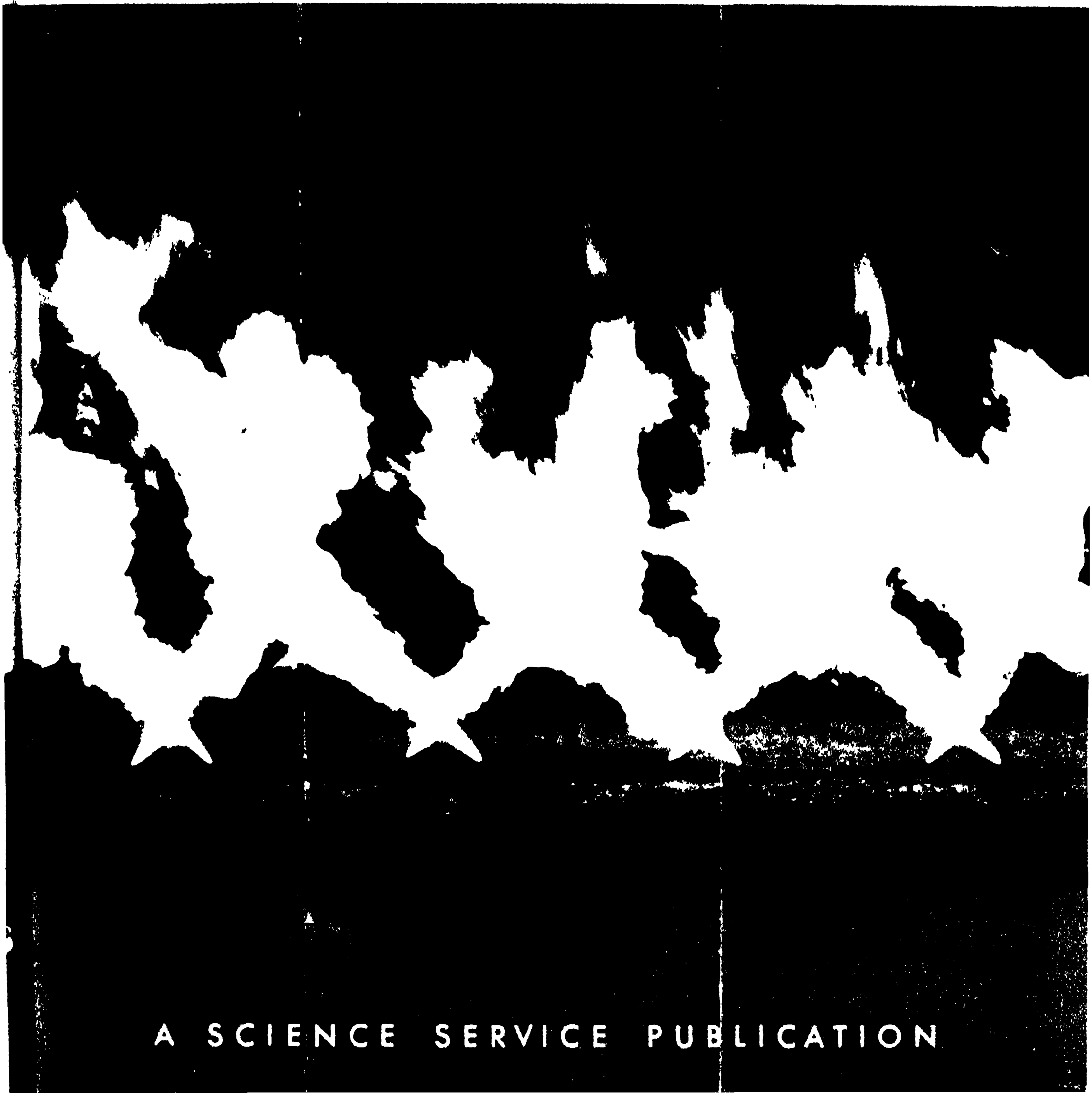
SCIENCE NEWS LETTER



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ASTRONOMY

Red "Coronium" Line in Sun

Findings indicate that the sun has regions of higher energy than suspected and may mean that gases are bubbling up from sun's interior.

➤ A NEW CHAPTER in one of the major astronomical mysteries was written when the American Astronomical Society was told that the red "coronium" spectrum line of light has been found in the sun itself, indicating that the sun has regions of much higher energy than previously suspected.

The researches of Dr. Leo Goldberg, this year named director of the University of Michigan Observatory, detected the broad and fuzzy absorption line of the solar disk that is identical with one of the most characteristic lights of the filmy, beauteous corona of the sun seen only during natural or artificial eclipse of the sun.

Discovery of this line and prominent green lines at solar eclipses in the last century caused astronomers to believe that a chemical element they named coronium existed only in the heavens and not on earth. Not until 1940 did Dr. Bengt Edlen, Swedish astronomer who attended this meeting, prove that the strange element was really common earth substances, iron, nickel and calcium, in highly excited states.

Discovery in the sun of the absorption line of iron from whose atoms nine electrons have been stripped is confirming incidental proof that there is no mysterious coronium.

Dr. Goldberg's findings, made in cooperation with Drs. R. R. McMath and O. C. Mohler of the McMath-Hulbert Observatory, may mean that gases are bubbling up from the sun's interior into its bright outer envelope.

Ships and planes making their way into polar regions will know their location more exactly because of research being conducted by Dr. Charles H. Smiley of Brown University. Measurements during the past three years of the flattening of the sun near sunrise and sunset have laid the groundwork for tables showing how much observations of moon, planets and stars near the horizon must be corrected because of atmospheric refraction. Arrangements have been made to observe sunrise and sunset at all latitudes from the tropical to the frigid zone.

Science News Letter, January 11, 1947

MEDICINE

Hemoglobin Aids Penicillin

➤ HUMAN BLOOD'S red coloring chemical, hemoglobin, makes penicillin a better weapon against stubborn infections in wounds and burns, Dr. Felix Jansey of Northwestern University Medical School reported to the American College of Surgeons.

The hemoglobin is obtained in the form of a sticky powder from blood or red blood cells discarded from blood and plasma banks. This is mixed with the penicillin and kept in the refrigerator until the surgeon needs it.

The advantage of using hemoglobin with penicillin is that this red color chemical from blood keeps a higher concentration of penicillin in the wound for a longer time than can be kept with any other method of giving penicillin. Since it comes from blood itself, the material is not irritating and does not cause any foreign-body reaction.

Dr. Jansey first tried this method in two Army hospitals in England during the war. It was for soldier patients whose infected wounds resisted every form of treatment, including injected penicillin. The laboratory reported that the germs causing the trouble were the kind penicillin could destroy if the mold chemical was given in high concentration. But when given by injection, penicillin concentration in the blood is less than one percent and that was not enough to kill the germs. So Dr. Jansey, then Lt. Col. tried sprinkling the penicillin-hemoglobin mixture into the wounds and got good results.

Just recently released from the Army, he has not had a chance yet to try this mixture in accidental wounds of civilian life. He feels sure it will be effective, but he does not advise using it in all wounds, since the great majority will heal without it. The mixture should be reserved for wound infections that will not clear up with other treatments.

Possibility of giving the hemoglobin-penicillin mixture by injection, to prolong the effect of the penicillin, is one Dr. Jansey hopes to explore in the near future.

Science News Letter, January 11, 1947

ZOOLOGY

Bikini Ships House Animals For Scientific Research

➤ THE GHOST ships of Bikini, still "hot" with radioactivity from the atomic bomb of July 25, now have animal "crews" aboard in order that science may know the medical effects of the atoms that are still exploding.

Capt. Rupert H. Draeger, U.S.N., of the Naval Medical Research Center, Bethesda, Md., who had charge of animal tests at the two bomb explosions, has returned from a return trip to Bikini atoll, by air, where he set up a new experiment to determine the danger of residual effects of atomic bomb explosions.

Installations of animals were made in cages aboard the ships so that they will be exposed to the artificially radioactive portions of the ships. Navy personnel in charge will visit the ships for a short time each day to feed and care for the experimental animals and observe what happens. It would be too dangerous for the medical men to live aboard the contaminated ships although almost six months have passed since bomb Baker was exploded.

At Kwajalein an additional set of experiments is in progress. Portions of the ships were removed and transported to that island to allow the convenience of dry land operation. The radiations to which more animals are subjected are provided by these still-active specimens from the target ships.

Weather is bad at Bikini now, Dr. Draeger told the American Association for the Advancement of Science session to which he and Dr. Shields Warren of Harvard Medical School reported the results of the effects of atom bombs on animals. The trade winds blow strongly, making it difficult to house the experimental animals safely and securely aboard the test ships.

Science News Letter, January 11, 1947

BIOLOGY

AAAS Meeting Prize Split

Two researches in biology win the $1,000 prize for Drs. Q. M. Geiman and R. W. McKee, and Dr. T. M. Sonneborn and associates.

➤ THE TWO researches in biology that have split the annual $1000 American Association for the Advancement of Science prize might be titled (by a "who dunnit" writer):

"Blood Sacrifice For Malaria Germs."

"Chemical Murder Among the Paramecia."

Dr. Q. M. Geiman and Dr. R. W. McKee of Harvard University, winners of half of the award, did use their own blood in their investigations that promise to lead to advances in understanding other blood parasite diseases as well as malaria.

Breeding microscopic one-celled water animals of a special kind that can commit chemical murder was involved in the prize researches at Indiana University conducted by Dr. T. M. Sonneborn, with the cooperation of Misses Ruth V. Dippell and Winifred Jacobson.

Malaria Combatant

The research that won their share of the prize for Drs. Geiman and McKee was born of the wartime search for more effective ways to combat malaria. During the war, numerous scientists had sought a method that would make malaria germs grow outside a human or animal body, in laboratory flasks or test-tubes. These were only partially successful, but advances were made nevertheless.

Beginning just a year ago, the Harvard team made final improvements that made it possible to substitute a synthetic fluid for blood serum in which the red corpuscles that housed the malaria germs could float and find nearly normal nourishment. This contained crystalline albumin, glucose, sodium acetate, glycerol, para-aminobenzoic acid and other vitamins, and all known amino acids. Of the latter, methionine is most essential.

In this semi-artificial blood the germs of a monkey malaria lived and grew. That they were normal in their ability to cause malaria was proved by injecting some of them into healthy monkeys, which presently became sick.

It was also possible to cultivate the germs of human malarias, particularly the vicious vivax type, in an earlier type nutrient fluid in which human blood serum was used. The two experimenters sacrificed blood from their own veins for this purpose, and also "tapped" some of their laboratory associates. On the germs thus cultivated, new antimalarial drugs were tested in glass vessels, and the results confirmed by subsequent tests on actual malaria patients.

Linlithgow Library.

Drs. Geiman and McKee hope to see their technique developed to a point where it can be used in the study of other diseases caused by blood parasites, such as African sleeping sickness.

Paramecium Murderers

Dr. Sonneborn has been working for ten years on the problem on which he and his feminine fellow-scientists received half of the prize. The most spectacular phase, and the one on which he and his teammates presented three papers at the meeting, has to do with the development of a line of hereditary chemical murderers in carefully bred cultures of the microscopic one-celled water animal known as paramecium.

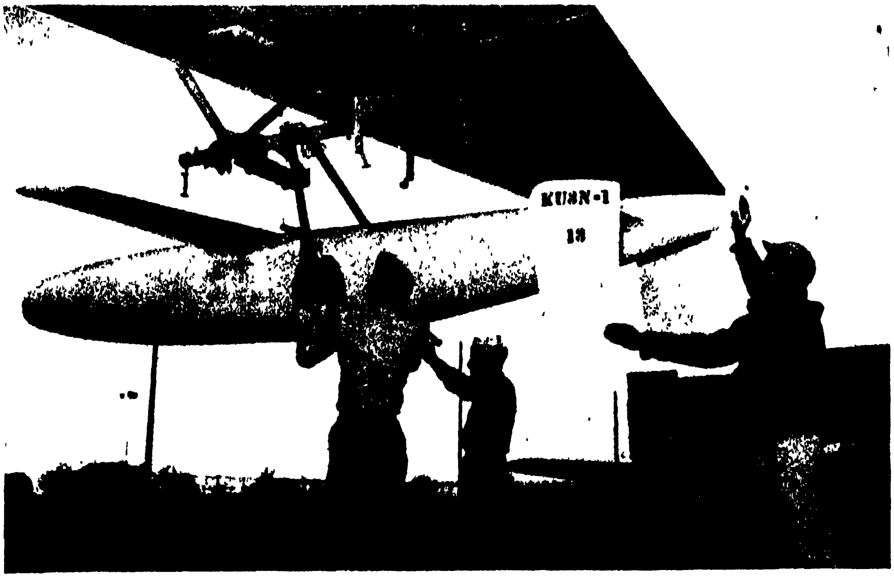
This hereditary line secretes an antibiotic compound that kills paramecia of any other strain that comes into contact with it in the water. He has named this substance paramecin. Several strains are able to produce paramecin in varying strengths, but one seems to be dominant over all the others in deadliness—regular paramecium prussians.

Paramecin production depends on a factor in the general cell-protoplasm of the paramecian body, which Dr. Sonneborn has designated with the Greek letter kappa. This belongs to the peculiar class of cell-substances termed plasmagenes. Kappa is under the biological orders of a "regular" gene in the nucleus, which Dr. Sonneborn calls K. Unless both are present, neither can act, and no paramecin is secreted.

Although kappa and all other plasmagenes are ruled by their respective nuclear genes, they are not produced by them. Only when cell-protoplasm, or cytoplasm, containing them is passed on from one generation to the next in reproduction are more plasmagenes produced.

The paramecin generated by this K-kappa combination is extraordinarily poisonous to non-resistant paramecia. One particle of it, perhaps only one molecule in size, is able to kill.

The paramecia that produce paramecin are themselves resistant to its action. But they can be made to lose this immunity. If they are kept at a tempera-



REMOTE CONTROLLED—KU3N-1 is an air-to-ground missile, launched from under the wing of its parent airplane and flown by remote control from another plane. This missile can reach its target at speeds greater than 500 miles per hour. Official U. S. Navy Photograph.

ture between 32.8 and 34.2 degrees Centigrade, kappa ceases to multiply and produce paramecin. After a time, the now non-productive strain becomes sensitive, and can be killed by the paramecin of its still-virulent sibling cells.

Science News Letter, January 11, 1947

ENGINEERING

Guided Missile Research Computed from 1,200 Miles

➤ BUFFALO, New York, is 1,200 miles from Daingerfield, Tex., but when an engineering problem arises, it takes only a few seconds to cover the distance.

Guided missile models are being tested at supersonic speeds in a wind tunnel at the Lone Star Laboratory in Daingerfield. When peak loads of data from the missile studies threaten to bottleneck work in the Texas laboratory, the data are teletyped to the Cornell Aeronautical Laboratory. The computations are sent back by teletype when completed.

This long distance computation service is a part of guided missile research work being carried on by the Johns Hopkins University Applied Physics Laboratory for the Navy Bureau of Ordnance.

Science News Letter, January 11, 1947

PLANT PHYSIOLOGY

Microscopic Plant Sheds Light on Photosynthesis

➤ A MICROSCOPIC plant has given new information of possible significance in the still-unsolved puzzle of what green plants first make when they use sunlight and carbon dioxide to form food. Some scientists have claimed it is glucose, others say it is starch.

Prof. Jack Myers of the University of Texas used in his experiments the microscopic one-celled plant named Chlorella, he reported to the meeting of the American Association for the Advancement of Science, which can make food like any other green plant but which also has the peculiar animal-like ability to use ready-made food at the same time. He measured its ability to oxidize glucose in the dark, then in short daylight periods when it was making food. He found that the rates were the same in both instances. Hence he concludes that in this plant, at least, the first food made is not glucose but starch.

Science News Letter, January 11, 1947

American *railroads* employ over 1,375,000 persons.

GENETICS

Mouse Mutation Speeded

Methylcholanthrene produces evolutionary changes in mice. Changes were made in color of body and speed-up in the rate of mutations.

➤ EVOLUTIONARY changes in mice produced by a chemical compound, methylcholanthrene, were announced before the meeting of the American Association for the Advancement of Science by Dr. L. C. Strong of Yale University School of Medicine.

Chemistry thus joins physics, as represented by X-rays, radium radiations, ultraviolet rays and heat, all of which have been successfully used during the past quarter-century in speeding the production of those sudden evolutionary jumps known as mutations. For pioneer work of this kind with X-rays, Dr. H. J. Muller of Indiana University recently received a Nobel prize.

In his experiments Dr. Strong used three strains of uniformly brown-coated mice, which by the end of the research reported to the meeting had been inbred for twenty-five generations. The chances of their being of non-uniform heredity he therefore holds to be minimized.

After Dr. Strong had satisfied himself of the genetic dependability of his mouse strains, he began injecting doses of the chemical, and watching for signs of hereditary change, particularly in the direction of cancer production. He selected among the progeny for mice that showed cancer resistance. Several breeding lines showed improvement in this respect for a number of generations but then began to backslide, reverting to the original degree of cancer susceptibility in a few more generations. One line, however, kept the gain in resistance it had made, and still has it.

Other mutations thus chemically produced included change from the uniform brown color all over the body to a different color on the underside. These changes range from what Dr. Strong termed "pale black" to cream-color. Some of the lines developed spotted coats, and at least one strain now has white ears.

Most striking of the results would appear to be the rate of mutation, which was greatly speeded by the chemical.

Use of a group of chemical warfare agents, the nitrogen mustards, for producing mutations has recently been reported. However, Dr. Strong stated, the effects of these chemicals more nearly resemble those of physical agents.

Science News Letter, January 11, 1947

The battle against *insect pests* will long continue because they seem to be able to adapt themselves to new environments and to develop a resistance to control measures.

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RADIO

Wavelength Carries Voice, Radiotype Message Together

➤ THE SAME wavelength can carry the human voice and a radiotype message at the same time by a dual-purpose radio system, an invention of Walter S. Lemmon, president of the World Wide Broadcasting Foundation.

It is an important development because demands for the wavelength channels used in ordinary broadcasting are far greater than the number of bands available. With the new device, short-wave transmitters are used. Using the same wavelength for two transmissions doubles the capacity of the air.

A crystal device at the transmitter changes very slightly the wavelength of one of the messages using the same wave. It is said to "split" the wave. It is put in the transmitter in place of the ordinary crystal. The voice and the radiotype messages travel together but independent of each other.

At the receiving ends, either at the same location or far separated, a short-wave receiving set, fitted with a special electronic attachment, can be tuned to pick up one message or the other, eliminating the one not wanted.

Science News Letter, January 11, 1947

MEDICINE

Instrument Aids Surgeons In Removing Skin

➤ SURGEONS removing skin from the human body to graft elsewhere will be aided by an improved instrument which enables them to see at all times just how the device is operating. The instrument, called a dermatome, has a semi-cylindrical drum that rotates over the surface of the person at the point where the skin is being removed. By means of an adhesive on the drum, the skin is lifted as the drum revolves so that it can be safely severed by a sharp cutting edge fixed in the instrument to follow the drum.

In the improved device, a mirror is attached to the framework behind the cutting blade holder at the proper angle so that the surgeon can see under the drum where the blade is in operation. Patent 2,413,354 was awarded for this device to John A. Jenney, Flushing, N. Y.

Science News Letter, January 11, 1947

RADIOTYPE MACHINE—The dual system of broadcasting is demonstrated by Walter S. Lemmon, right, inventor.

EVOLUTION

Egg Came Before Chicken

Production of hard-shelled egg was important step in evolution. It enabled reptiles to lay eggs on land and evolve the stocks that produced mammals and birds.

➤ THE EGG did come before the chicken, Prof. Alfred S. Romer of Harvard University told an audience of fellow-scientists at the Conference on Genetics, Paleontology and Evolution held in connection with the celebration of Princeton University's Bicentennial.

Production of hard-shelled eggs was a most important step in evolution, Prof. Romer pointed out. It enabled reptiles, which pioneered in this innovation, to lay their eggs on land, and thus freed them from dependence on water, necessary for the thin-shelled, more perishable eggs of amphibians and fishes. Free to rove the land at will, reptiles could go ahead and evolve the stocks that eventually produced mammals and birds—among them, the chicken.

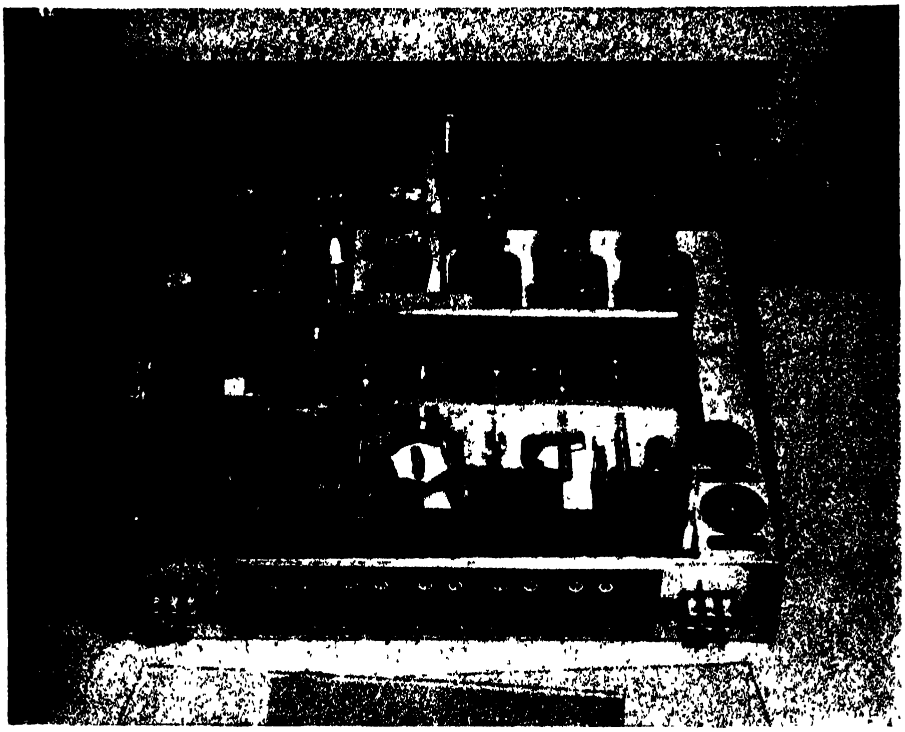
The speaker cited this as an example of preadaptation—the production of characters or organs by evolving animals in advance of the use to which they were subsequently put. It is not so much that such made-in-advance evolutionary changes anticipate their eventual uses, he explained, as that they give an immediate advantage under existing conditions, and keep it, perhaps even extending it, when conditions change.

As other examples, Prof. Romer mentioned lungs and legs. These organs usually thought of as belonging primarily to land animals actually had their beginnings in fishes. Present-day tropical lungfishes make little or no use of their gills, but gulp air from the surface into primitive lungs. Land animals have merely kept and improved on these ancient pristine inventions.

England's majestic oaks are really more American than English. Oaks with broad, lobed leaves, like the familiar white, black, scarlet and bur oaks, evolved mainly on this continent, said Prof. R. W. Chaney of the University of California.

The original ancestral oaks, that lived in Cretaceous geologic times, during the declining days of the dinosaurs, had thickish, smooth-edged leaves like those of the present-day live-oaks of the South and Southwest. In the earlier part of the age of mammals, new Cretaceous oaks arose with toothed or wavy margins on their somewhat larger leaves. Not until Miocene time a little after the middle of the age of mammals did full-fledged, full-sized, deeply lobed oak leaves of the present-day type grow on trees.

Science News Letter, January 11, 1947



HELPING IT TICK—Rear view of the National Bureau of Standards seconds pulse generator and time interval selector used in the time control equipment of the Bureau's radio station WWV.

PHYSICS

Crystal Clock Broadcasts

National Bureau of Standards uses crystal clocks with electronic circuits to tell time to the world in only service of this kind.

➤ THE WORLD'S only continuous time signal service uses crystal clocks with electronic circuits to answer the question, "What time is it?" with accuracy down to a millionth of a second.

The crystal clocks' scientific timekeeping is broadcast throughout the world from the National Bureau of Standards radio station, WWV Beltsville, Md. If you think your watch is keeping accurate time, you can check it with the Bureau's shortwave time signals 24 hours a day on one or more frequencies.

A flawless crystal of quartz with series resonance of approximately 100,000 or 200,000 cycles per second is the heart of the clocks. Electron-tube circuits oscillate the crystal continuously, and the resulting frequency is divided into 60 cycles per second with no loss of accuracy.

Automatic announcement equipment for the time broadcasts at intervals of one minute, five minutes and 30 minutes comes from a synchronous motor powered by the 60-cycle frequency. The motor, through gear trains, drives the contacts which control the time interval announcements.

A highly accurate seconds pulse is broadcast using a one-second contact which opens an electrical gate. These pulses are determined by the crystal oscillator frequency which has an accuracy within a few parts in 100,000,000. Phase shifts and other difficulties cause the actual broadcast second to slip to an accuracy of one microsecond, one-millionth of a second.

Conditions affecting the accuracy of the quartz crystal of the clock include temperature, pressure and humidity. The pressure and humidity are kept constant by sealing the quartz plate in a metal or glass enclosure, while the plate and certain important parts of the circuit arrangement are put in a constant-temperature oven.

Two important differences between the electronic crystal clock and the conventional pendulum clock are the fact that changes in the gravitational constant do not affect the crystal clock's accuracy, and it is possible to compare crystal clocks at high frequencies to determine erratic behavior accurately. Equipment used to compare the clocks will accurately note a difference equal to one second in 50 years. Differences between absolute time and the broadcast time signals are constantly being checked by the Naval Observatory.

Science News Letter, January 11, 1947

MEDICINE

Radium Aids Hearing In Adenoid Defect Cases

➤ A NINE-YEAR-OLD boy was failing in school. He had a speech defect and was thought to be mentally defective. His identical twin brother was leading the first division of his class in school. The dull child had not had any ear trouble, but at times his family felt he had some deafness. He had had his tonsils removed and two operations for adenoid removal.

Examination showed a mass of adenoid tissue which had completely overgrown the Eustachian opening and an abnormal condition of the ear drum. Another operation for removal of the adenoid tissue did not improve his hearing.

He was then given radium treatment and within six months there was not only improvement in his hearing, but his speech defect had disappeared and he was with his twin in the first division of his class.

This dramatic case history was reported to the American College of Surgeons by Dr. John E. Bordley, of the Johns Hopkins Medical School, to illustrate the results that can be obtained with the use of radium in conductive deafness due to obstruction of the pharyngeal end of the Eustachian tube with lymphoid or adenoid tissue.

This method is not effective in other forms of deafness. It is more effective when started early and best results are obtained in children.

No single serious reaction has followed any of the thousands of these radium treatments given at Hopkins nor any of the 14,000 given in the Army Air Forces aerotitis control program.

Science News Letter, January 11, 1947

GENERAL SCIENCE

Science Foundation Urged

American Association for the Advancement of Science adopted policy calling for federal authorization of a National Science Foundation.

➤ CONGRESS is to be informed by a new inter-society committee of scientists that the scientific world is solidly behind the creation of a National Science Foundation.

The most important action of the American Association for the Advancement of Science annual meeting held at Boston was the unanimous adoption of policy statements that called for the federal authorization of a National Science Foundation "to support fundamental scientific research and the education of scientists" as of "the utmost importance for the health, security and welfare of the nation."

Every scientific organization of national scope is to be asked to join with the AAAS in forming the foundation committee. Thus there will be created a body of about 200 scientists and educators willing to advise the Congress on the details of what should be done.

There has been wide support in scientific circles and in Congress for some sort of National Science Foundation and the most favored bill, S. 1850 of the 79th Congress, passed the Senate and died in House committee.

Considerable differences on details did develop which resulted in various groups backing different bills. Whether this will happen in the new Congress remains to be seen.

Some scientists wanted the foundation organized under an administrator and others favored a part-time board of scientists to have control. Some favored patent rights in any discoveries to be dedicated to the public or held by the government while others wanted commercial rights to be left with the scientists who made the discoveries. Because the grants of federal money under the proposed foundation would be for pure or basic research to develop knowledge of a fundamental character, it is argued that the patent question actually is of little importance.

The new committee may be able to settle such differences. One basic study stressing the need of a science foundation was the report that Dr. Vannevar Bush made to President Truman in July, 1945. Another was the report of the Senate Committee on Military Affairs in April, 1946, resulting from extensive hearings under Senator Kilgore, D., W. Va.

It seems likely that a new bill reconciling various points of view may be prepared and introduced under Republican auspices. In Boston discussions it was reported that Dr. Bush might now be willing to agree to a foundation under an administrator rather than the board that his report recommended. This would resolve one past conflict.

Both Army and Navy have been on record in the past favoring a civilian science foundation, and extensive Navy research grants to colleges in the past year are considered by its spokesmen as evidence that future national defense needs such basic inquiries urgently.

Science News Letter, January 11, 1947

ASTRONOMY

Sun Gas Speed Calculated

➤ MANY NEW facts about gigantic eruptions upon the sun will be discovered through use of a new tunable filter announced for the first time by Dr. Bruce H. Billings, Research Laboratories of the Polaroid Corporation.

The speed with which gases, rising from the sun in the form of prominences, move toward us and the actual position of these prominences in relation to the sun can be calculated with this instrument, Dr. Billings told members of the American Astronomical Society meeting jointly with the astronomy section of the American Association for the Advancement of Science.

The filter, designed for use at the High Altitude Observatory of Harvard University and University of Colorado at Climax, Colo., makes it possible to use electrical controls to tune out all except the desired wave length. The active elements of the filter consist of a series of plates of a crystal of high electro-optic coefficient which are paired with the customary filter elements. The pass band can be shifted in a fraction of a millisecond.

The filter was designed for use in studying that component of the motion of solar prominences which lies along our line of sight. In use it would be combined with a Lyot type coronagraph. By noting the amount certain identifying spectral lines are shifted, the speed with which the various gases forming the prominence move toward or away from us can be determined.

Science News Letter, January 11, 1947

CHEMISTRY

Stable Organic Compounds Reduced by New Chemical

➤ HIGHLY STABLE organic compounds are easily reduced by a new chemical, discovered in 1945 but just revealed. They yield to it at room temperature and at normal pressure. It is lithium aluminum hydride.

This chemical, that promises to become a universal reducing agent for organic compounds, has now been reported to the American Chemical Society by Prof. H. I. Schlesinger and A. E. Finholt of the University of Chicago who discovered it while engaged on a project for the U. S. Naval Research Laboratories.

The chemical is easily prepared from lithium hydride and aluminum chloride. It is a white crystalline solid readily soluble in ether, the solvent in which most of its reduction reactions are carried out. It has been successfully applied to the reduction of aryl nitro compounds to the azo acids, nitriles to primary amines, and ketones, esters, aldehydes, anhydrides, and acid chlorides to their corresponding alcohols.

The new chemical will prove useful in inorganic work also. It has been used to prepare other metallic hydrides, some of which have never before been obtained in large quantities. It affords a direct method for replacing a halogen atom with a hydrogen so that such compounds as alkyl silanes can be prepared directly from alkyl silicon chlorides.

Science News Letter, January 11, 1947

Color in *stained glass* is obtained by including very small amounts of metallic oxides in the mix.

AERONAUTICS

Two Living Men Ejected From Fast Flying P-61

➤ TWO LIVING men have already been safely shot from a P-61 airplane flying at approximately 300 miles per hour in tests of the Army's ejector for enabling pilots to clear jet aircraft in emergencies, Dr. Henry M. Sweeney, chief of the biophysics branch of the Aero Medical Laboratory at Wright Field, revealed at the meeting of the American Association for the Advancement of Science.

A pilot must leave the cockpit at a velocity of approximately 60 feet per second to clear the tail of our aircraft at full speed. Information gained shortly after V-E Day on German methods of ejecting men from jet aircraft could not be applied completely as our aircraft had a central vertical stabilizer on the tail, rather than a split tail, and traveled at a greater speed.

Rocket power and compressed air were considered for the propelling force but powder charges were finally selected because of smaller weight and less area of vulnerability to enemy gunfire.

The gun now in use is three feet in tube length but develops a five-foot stroke by its telescopic action. Arm rests on the pilot's seat are used to reduce the force applied to the lower part of the spine resulting from the acceleration during ejection. The seat cushion is reduced to a minimum and the pilot must assume proper posture for safe ejection. The tests Dr. Sweeney reported showed that under these conditions a 45-foot per second velocity charge developing from about 12 g on the seat to as high as 30 g on the hip can be ridden safely for very brief periods.

Science News Letter, January 11, 1947

PSYCHOLOGY

Average Mental Patient Has I. Q. Around 92 Points

➤ THE AVERAGE mental patient has an I. Q. (intelligence quotient) eight points below the normal expectancy of 100 points, Dr. Albert Rabin of the New Hampshire State Hospital at Concord, N. H., reported at the meeting of the American Association for the Advancement of Science.

Alcoholics and neurotics rated highest intellectually, epileptics and syphilitics among the lowest.

His report was based on adult intelligence tests given to 1,000 state hospital patients representing consecutive admissions. In the group 21 different kinds of mental illness had been diagnosed.

These patients had had about as much school education as the general population of the United States. They did not, however, reach as high occupational levels before entering the hospital as the population of the state as a whole.

Fewer of them had been in professional and managerial work and more had been in service and unskilled occupations.

This was especially true of patients with schizophrenia, serious mental disease in which the patients seem to live almost completely in a dream world of their own. Among these patients the discrepancy was greatest between how far they went in school and the kind of jobs they had before entering the hospital. Intellectual deterioration is insidious and begins early in these patients.

Science News Letter, January 11, 1947

BACTERIOLOGY

Germs Aid Increase In Oil-Well Yields

➤ BACTERIA are put to work to increase oil-well yields, in a process on which U. S. patent 2,413,278 has been granted to Dr. Claude E. ZoBell, marine bacteriologist at the Scripps Institution of Oceanography, La Jolla, Calif. The patent is assigned to the American Petroleum Institute, which has dedicated it "to the public throughout the world."

The microorganism used is a comparative newcomer to bacterial science, and until now has not received a specific name. It belongs to the genus *Desulfovibrio.* It is peculiarly adapted to conditions prevailing in deep oil wells, for it thrives best in strong salt brine, likes high temperature, and cannot live in the presence of either light or air. It feeds on sulfur compounds found in oil, and apparently also on the larger molecules of the oil itself. Because of this peculiar way of life, Dr. ZoBell has named it *Desulfovibrio halohydrocarbonoclasticus.* Its action in releasing oil from the grip of rock pores and sand crevices is several-fold. It generates acid, dissolving limestone and thereby enlarging flow channels. It lowers surface tension, making the oil more free to flow. It produces carbon dioxide, thus increasing the oil-pushing gas pressure. Its action in "cracking" large molecules also makes the oil more fluid.

Science News Letter, January 11, 1947

IN SCIEN

BIOLOGY

Parts of Mosquito Moved To New Host for Study

➤ MOSQUITOES served as guinea pigs in some exceedingly delicate experimental surgery performed by scientists at the Connecticut Agricultural Experiment Station. Eyes, wing-buds, beginnings of legs, and other organs were removed from young larvae, or "wigglers", and planted in the body cavities of other larvae, of pupae, and of adult insects, with almost microscopically fine glass instruments.

Object of the experiments was to find how hospitable (or otherwise) the older environments would be to the young tissues. It turned out that the older the new host insect the less well the transplanted organs grew. Hormones, or internal gland secretions, are believed to be responsible: the older the insect the more different its hormones are from those of the younger stages.

Apparently it made no difference to the growing organ that it was not in its natural position. Eyes, wings and legs grew just as well inside the body cavity as they would have had they been left where they started. The one difference was that the lens parts of the eyes turned inward instead of outward.

Science News Letter, January 11, 1947

EDUCATION

Sighted Persons Learn To Read Braille to Teach

➤ SIGHTED PERSONS as well as the blind are being taught to read Braille at the New York Institute for the Education of the Blind. The students with good eyesight are teachers, who must learn the system in order to correct and grade the Braille-written work of their pupils.

Latest development in teaching Braille to the sighted is the flash method, used during the war to teach servicemen how to recognize aircraft. Braille characters, instead of planes, are flashed on the screen here.

The final test of the sighted teachers in their course is reading by touch. For the final examination, they are required to read in darkened classsroom.

Science News Letter, January 11, 1947

E FIELDS

CHEMISTRY

Cleaning Compound Frees Aluminum from Oxide

➤ CLEANING composition for removing oxide films from aluminum and aluminum alloys contains ammonium silico-fluoride and sodium acid sulfate. It has enough ammonium sulfate to prevent the formation of a precipitate in water solutions of the cleaner. The patent, 2,413,365, was awarded to Lowell R. McCoy, Detroit, and is assigned to Wyandotte Chemicals Corp., Wyandotte, Mich.

Science News Letter, January 11, 1947

CHEMISTRY-PLANT PHYSIOLOGY

Gas-Mask Means May Save Apples in Storage

➤ GAS-MASKS of World War I vintage have contributed an idea that may be the means of saving apples in storage from ripening too rapidly.

Most important single item in the gas-mask canister was activated coconut-shell charcoal, whose myriad minute crevices offered a great internal area on which the molecules of the poison gases were adsorbed. Prof. R. M. Smock of Cornell University uses the same basic idea in apple storage houses, drawing the air through canisters of coconut-shell charcoal with suction fans to remove the ethylene gas that stimulates apples to premature ripening. There is no way of preventing ethylene from getting into places where apples are stored, for the apples themselves generate it in the ripening process. If a few apples start ripening up, the ethylene they give off starts others, until finally the whole warehouseful of apples may be in a mad chemical race toward precocious maturity. This premature ripening in storage is usually accompanied by widespread occurrence of scald, one of the worst types of apple spoilage.

As soon as Prof. Smock's method can be placed on a full-scale commercial basis it should result in large savings to apple growers and handlers, and longer continuance of apples in the market in spring. Cost of de-ethylenizing of storage-house air is reckoned at about one-half cent per bushel.

Science News Letter, January 11, 1947

HISTOLOGY

Specimens Shine in Dark With "Shining Stains"

➤ SPECIMENS intended for examination under the miscroscope may now be chemically treated so that they will shine in the dark, in addition to the time-tried practice of using colored stains visible only in the light. At a demonstration before the American Association for the Advancement of Science, Prof. Charles T. Brues and Dr. Ruth C. Dunn of Harvard University showed how the new method brings out certain details in insect body structure.

The "shining stains" are fluorescent compounds that give off visible light, usually yellow, when exposed to invisible ultraviolet radiation. Most of the compounds come from the roots of plants, especially certain members of the poppy family.

Science News Letter, January 11, 1947

ENTOMOLOGY

Gammexane-Dosed Animals May Help Control Pests

➤ BEDBUGS, mosquitoes, ticks and other blood-sucking pests may in future be controlled by feeding an insecticide, such as gammexane, to animals. The insects would then get their poison dose from the blood they sucked when feeding on an animal.

Success in preliminary trials of this super-Borgia scheme for controlling insects is reported by Dr. Botha De Meillon, entomologist of the South African Institute for Medical Research.

He mixed powdered gammexane, which is a super-DDT, with agar and let this jelly-like material set. It was cut in cubes and one cube fed to a rabbit every morning. Bedbugs in all stages fed fully on the rabbit and showed signs of paralysis immediately after. Not all died, but in his report to *Nature,* Dr. De Meillon states:

"A colony of bedbugs would have little chance of surviving many generations if they feed continuously on a gammexane rabbit."

Yellow-fever mosquitoes fed fully and became paralyzed. All fully fed females died within 24 hours.

Ticks apparently noticed that something was wrong because they did not feed fully on the rabbit with gammexane in its blood. They showed obvious signs of distress which persisted for days; within 10 days all the ticks in the experiment were dead.

Whether animals would be poisoned by feeding continuously on gammexane has not yet been determined. If they are not, or if some other chemical that kills insects but is safe for animals is developed, the method should prove valuable for controlling blood-sucking insects. Dr. De Meillon points out that it would have great possibilities in the veterinary sphere.

Science News Letter, January 11, 1947

EDUCATION

Children Seen, Not Heard To Learn Silent Reading

➤ THE OLD IDEA that children should be seen, not heard, seems to apply to learning to read.

Prof. G. T. Buswell of the University of Chicago told the psychology section of the American Association for the Advancement of Science that schools should use silent reading methods rather than oral because reading is a matter of thinking and seeing, not saying words.

If you read slowly, Prof. Buswell might find that you are a "sub-vocalizer" who reads noiselessly but not silently. He reported tests with a group of adults who complained of a slow reading rate.

Pointing out that a striking number of the cases showed a rate very close to the individual's oral rate of reading, Prof. Buswell said, "The fact was that they were sub-vocalizers—the victims of a method of teaching reading that fixed oral-reading habits first and so strongly that the later silent reading was only noiseless reading, showing none of the characteristics common to effective silent reading."

In a reading clinic where they were forced to read faster than they could say the words they read, the group averaged a 60% gain in rate of reading without loss of comprehension.

The average rate of reading, according to Prof. Buswell, is 300 words per minute for non-fiction material at the end of the program of instruction in the schools, but rates of 600 to 800 words per minute may be reached.

Where the number of words per minute is as low as 150, not uncommon in both high school and college, the variation has been found roughly proportional to the amount of sub-vocalization present.

Science News Letter, January 11, 1947

AERONAUTICS

Safe Landing in Ceiling Zero

Radio, radar, fog dispersal and lighting make modern flying safer. Problem is not to stay in air in rough weather but to avoid collisions and land safely.

By A. C. MONAHAN

See Front Cover

➤ MODERN planes can fly through clouds, overcast and many storms; they fly with safety if no hidden mountain peak or towering building is in their path. The great problem is not keeping in the air in overcast weather; it is in avoiding collisions and making safe landings.

All-weather flying may be expected in the near future. Landing in overcast and avoiding obstacles in flight are, perhaps, the two major problems confronting aviation today. They are related problems, and much has already been accomplished to solve both. The hazard of invisibility in aviation, it may be said, is rapidly being overcome.

Several Systems Used

Experts seem to agree that there is no single type of equipment or landing system now known that will meet all conditions. Radar, high-frequency radio, glide beams, radio markers, runway lighting, and fog dispersal by heating and cloud dispersal by freezing, may all play a part. But none of these by itself appears to be sufficient. Even the Civil Aeronautics Administration's three-element instrument landing system seems inadequate in many situations.

Whatever landing system is finally adopted, it must become universal in use. All airports for commercial transports must be similarly equipped. Special apparatus on planes must be provided. The total cost will be great, and both ports and planes are justified in delaying installations until an agreement has been reached and the government aviation authorities have made a final decision.

Radar was hailed during the war as the cure-all for the hazards of civilian air transportation. It is not, at least not in the present stage of development. Radar played a part in winning the war, the value of which can not be over-emphasized. In aviation, it saved hundreds of American lives, and brought destruction to thousands of enemies and great masses of enemy installations.

War-developed radar equipment, however, was bulky, requiring considerable space and special crew members to operate. Transports hesitate to install equipment whose weight and space requirements decrease payload capacity. They question using apparatus requiring specially-trained personnel.

The first wide use of radar in commercial and private aviation will probably be installed in planes for the detection of objects ahead in order to avoid collisions. While the number of disastrous accidents in commercial transportation is small in proportion to the number of flights, most of them have been collisions in low visibility with mountain peaks and steep rising cliffs.

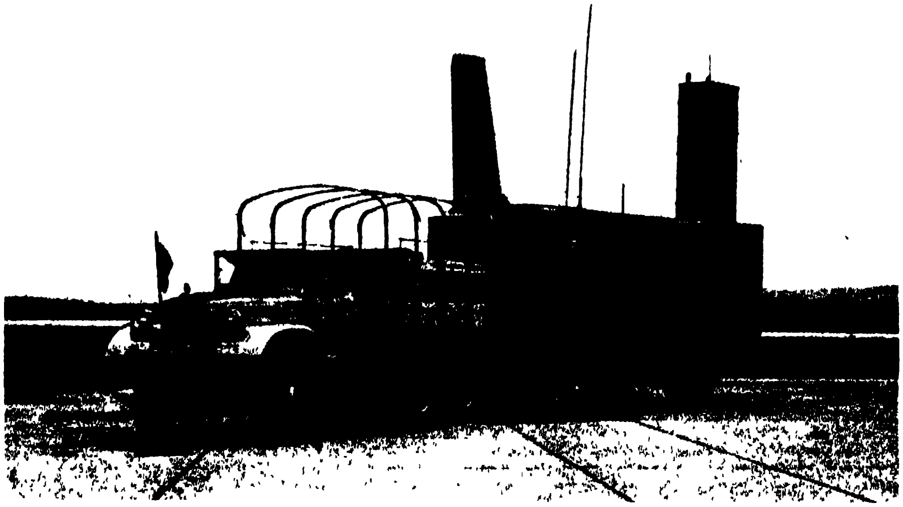
New light-weight radar sets have been developed for commercial planes and are being experimentally tested in the air. Still lighter sets for private planes have also been developed. Mountain collisions should soon be a thing of the past. It is a question, however, whether or not these radar sets would be of much help to a low-flying plane over New York, with the Empire Building ahead.

War-developed radar, the so-called ground control approach apparatus (GCA), is hailed by many as a complete solution to the problem of making safe landings in overcast. Others disagree. It was used widely and successfully in the last years of the war by the Army and Navy, and is still being used. It is being installed at a number of commercial airports by the U. S. Civil Aeronautics Administration to supplement its so-called three-element instrument landing system. Also, new GCA apparatus is now available which is much simpler to use than the earlier equipment.

Bulky Equipment

This ground control approach system, however, still requires bulky, expensive equipment installed either on the landing field or in the control tower. A constantly rotating antenna picks up on its scope any approaching plane within some 30 miles, locates its position and follows it in flight. Radar also shows the operators of the equipment the landing runway.

The pilot is directed into position for approach and landing by radio instructions from the radar operators. The plane needs no special equipment except its radio receiver. When it is within some 50 feet or so of the ground, where the pilot can see the lighted runway, he takes

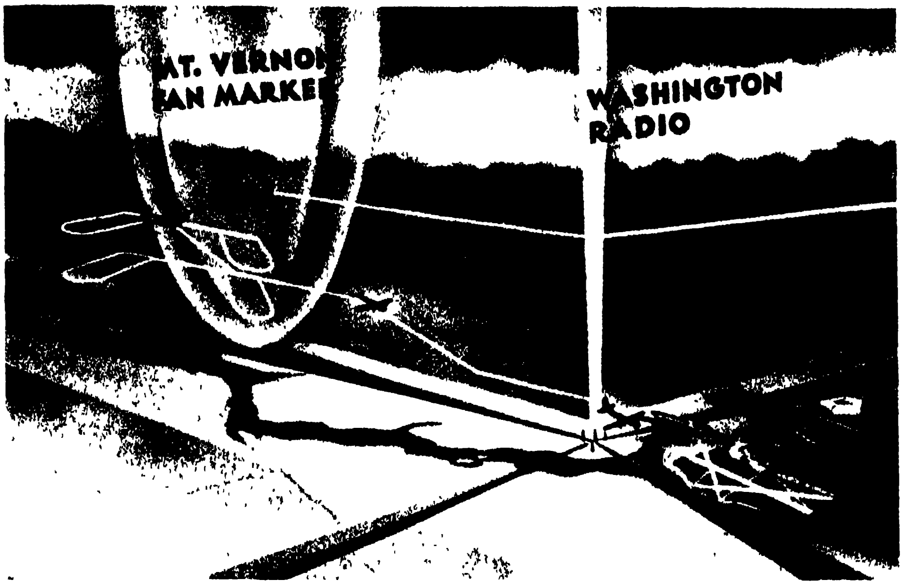


RADAR ON WHEELS—Mobile radar Ground Control Approach units, such as this used by the Army Air Forces, are being installed in commercial airports.

over and makes the actual landing on his own.

The CAA three-element instrument landing system is not radar. It includes a radio signal called a localizer which is picked up by a pilot when some 15 miles from an airport and used as a guide along a straight path to the center of the runway. Also it includes a radio beam glide path which guides him down a safe angle to the surface. The third element consists of two or more radio beacons with fanlike beams, projected vertically, which inform him of his nearness to the field.

It is an automatic radio aid, giving ground-to-plane transmissions which indicate, through panel instruments, the location of the plane along the radio approach beam. A panel instrument in the plane guides the pilot's approach by two needles working on the same dial, one showing if he is headed in the right direction, the other if he is following the glide path downward.



EASING IN—Glide path landing is visualized by an artist of Federal Airways Service.

Automatic Pilot

A new electronic device, an automatic pilot developed by the Sperry Gyroscope company, may be used to keep the ship on the glide path. It does not replace the human pilot, however; he is needed to set the device to receive the localizd radio signals. When receiving properly, it guides the plane along the beam.

One important development in airplane guidance for landing, communication and following the beam along airways is the increasing use of very-high frequency transmitters and receivers. Ordinary radio is subject to blackouts during electrical and other storms, the time when most needed. The very high-frequency, VHF for short, is practically static-free. Planes require special receivers. Many of the larger airports now have VHF for planes properly equipped, and ordinary radio communciation for others not yet converted.

On cross-country flights, commercial planes, as a safety measure, follow well-defined airways marked by beacons for night flying, or beamed by radio and known as radio ranges. Although these beacon lights are still important for many users, more and more the trend is to radio ranges.

Basically, radio ranges consist of radio transmitters, at 200-mile intervals if low-frequency is used, which alternately transmit two interlocking signal patterns in Morse code. When a pilot is directly on a range course, the two signals merge in a steady tone. By the tone he knows whether or not he is on the range. Other signals from the transmitter identify the particular station.

Low-frequency radio ranges are now being replaced with very high frequency because of its higher reliability. One range using VHF has been in use experimentally for nearly a year, and nine others are now under conversion.

Effective Lighting

Regardless of radio and radar approach systems for planes, a pilot needs to actually see the runway before landing. Ordinary runway lighting systems are satisfactory for night landings in clear weather, and for day or night landings in light fogs. In heavy fogs, more is needed. Much attention, therefore, is being directed toward more effective lighting. The answer seems to be in the use of high intensity approach and runway lights.

In one tryout, the runway is lined by lights of 30,000 candle-power with five degrees of intensity. The intensity is controlled by the tower operator so that lights may be brightened or dimmed to meet the needs of the pilot or the demands of the weather.

Dispersing a heavy fog on airport runways may sound fantastic, but it has repeatedly been done. During the war in England, where fogs are really heavy, a method called "Fido" was developed. Planes can land safely under zero ceilings when Fido, pictured on the cover of this SCIENCE NEWS LETTER, burns away fog from runways. Gasoline was burned in long troughs along the edges of the runway. The heat produced was sufficient to disperse the fog long enough for a plane to land.

Later, the system was improved both in England and America. Either gasoline or fuel oil are used today. One method uses pipelines through which the gasoline or other fuel is forced to jets where it is ignited by remote control from the airport tower. This is a more economical method because it is

(See Page 28)

YOUR
HAIR
AND ITS CARE
By Oscar L. Levin, M.D.
and Howard T. Behrman, M.D.

NEW, REVISED, EXPANDED EDITION—JUST OUT!

If you want healthy hair, lovely hair, then you need the expert advice in this book.

Two medical specialists have here pooled their knowledge to give you in plain language the up-to-date scientific facts now available about hair. They tell you what to do to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, common and uncommon, as:

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Medical science is better equipped than ever before, to prevent hair trouble; or, if it already exists, to deal effectively with it.

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Do You Know?

Sulfate *turpentine* is obtained from from the crude waste liquor of paper mills.

Stained glass, which is chemically colored ordinary glass, has been used for over 16 centuries.

Speculum is an alloy plated electrolytically on household utensils to give a highly reflective finish; it is 45% tin and 55% copper.

The carotene content of *kale* is 50% or so more than that of carrots; carotene is the yellow-orange pigment which the body converts into vitamin A.

Nearly 100 Canadian vessels on the two coasts, the St. Lawrence and the Great Lakes, have been equipped with surplus *radar* developed for use on motor torpedo boats and patrol vessels.

Metal salts of ethylhexoic acid are superior paint and varnish driers with inoffensive odors.

From Page 27

under better control and requires less fuel.

Heavy clouds at low temperatures above airports or on approach paths may someday be converted into snow by particles of dry-ice, or solid carbon dioxide, spread within it by aircraft. This actually has now been done. The cloud must be of the type known as a supercooled cloud; that is, it must have a temperature well down towards zero Fahrenheit. Such supercooled clouds hold water droplets that are not frozen in spite of the below-freezing temperature. The dry-ice converts the droplets into snow, that slowly falls earthward, clearing the air.

Science News Letter, January 11, 1947

ELECTRONICS

Motion Picture Innovations

Magnetic recording of sound on motion picture films may replace other methods. Wire, paper disks, or tape are coated with magnetic material.

➤ MAGNETIC recording of sound, voices and music accompanying motion pictures promises to replace older methods in the motion picture industry, judging from scientific discussions of the subject at the meeting of the Society of Motion Picture Engineers in Hollywood.

Magnetic recording of the voice on wire, tape or paper disks coated with a magnetic material has come into wide usage in the past few years in the phonograph industry. The sound waves operate a mechanism that magnetizes the moving wire, tape or disk with intensities varying with those of the sound. When played back, the amount of varying magnetism on the record produces variations in the vibration of a diaphragm that reproduces the sound waves. One advantage of the method is that a record can be wiped off by use of a magnet.

A magnetic sound track on motion picture film is convenient and economical, Marvin Camras, of the Armour Research Foundation, Chicago, stated. The final recording can be monitored while being made and requires no processing. All or part of the record can be erased and a new record put on or edited in the usual manner.

Recent developments in magnetic recording have led to practical use of this art as a high-fidelity recording system, R. J. Tinkham and J. S. Boyers, Magnecord, Inc., Chicago, declared. They described a wire recording equipment characterized by good frequency response, low distortion and flutter.

New magnetic recording media, which will widen materially the field of application of the art, were presented earlier by Dr. S. J. Begun, Brush Development Co., Cleveland. Probably most outstanding among them, he said, is the nonferrous wire or tape, plated with a thin layer of nickel-cobalt alloy, and the paper disks and tapes coated with a dispersion of magnetic powder.

The magnetic characteristics of the coated and plated materials are such that it is possible to obtain good frequency response with relatively low speed of the recording medium.

Science News Letter, January 11, 1947

SAFETY

Colder Weather Makes Faster Braking on Ice

➤ YOU CAN STOP your car in a shorter distance on smooth ice when the temperature is 10 degrees Fahrenheit than when the temperature is up to 32 degrees. If your tires are made of natural rubber instead of the synthetic product, your car will have a shorter braking distance, too, tests conducted last winter by the National Safety Council showed.

Measuring the distance it took to stop a car on ice, investigators found that the braking distance declined as the temperature fell below freezing. Without chains, the distance was consistently shorter for cars with natural rubber tires. But at freezing when chains were put on the rear tires, the car with synthetic rubber tires was found to stop sooner. At a lower temperature, this was reversed and natural-rubber-tired cars came to a stop faster.

At freezing temperature, 32 degrees Fahrenheit, a car with bare tires of natural rubber stops in 193 feet on smooth ice, and a car with synthetic rubber tires in 225 feet.

Science News Letter, January 11, 1947

Photo courtesy Haverford College

RESISTANCE BOXES
FOR STUDENT USE

L&N instruments like those shown above take long and hard use by physics students in their experiments. The resistance boxes are made in 2-, 3- and 4-dial instruments with enclosed switches, and can be used in d-c or low-frequency a-c measurements. D-C resistant change from zero setting, measured across binding posts, equals readings ±(0.1% + 0.01 ohm).

The Adjustable Mica Capacitor has a total capacitance of 1 μf in 5 sections: 0.5, 0.2, 0.2, 0.05, 0.05 μf. Limit of error is ±0.25%.

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No moisture can seep through the seams of these raincoats — thanks to the electronic sewing machine developed at RCA Laboratories.

A sewing machine...without a needle or thread!

Since mankind first began to sew, say 15,000 years ago, seams have always meant "needle and thread."

But when new thermoplastic materials came along — specially developed for waterproof coverings such as raincoats — ordinary "needle and thread" seams wouldn't do because of their tiny holes.

Now — thanks to research at RCA Laboratories — goods made of thermoplastics are "sewn" by electrons and the seams are as strong as the material itself!

This will make possible dozens of brand-new uses for these inexpensive and durable thermoplastic materials. Even today they provide perfect packages for foods, meats and drugs because they are completely watertight, airtight and transparent. You've probably seen thermoplastic raincoats, tobacco pouches, shower curtains . . .

Research, such as resulted in the electronic sewing machine, is reflected in all RCA products. When you buy an RCA Victor radio or television receiver or anything bearing the name RCA, you enjoy a unique pride of ownership in knowing that you possess one of the finest instruments of its kind that science has yet achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20 . . . Listen to The RCA Victor Show, Sundays, 2:00 P. M., Eastern Time, over the NBC Network.

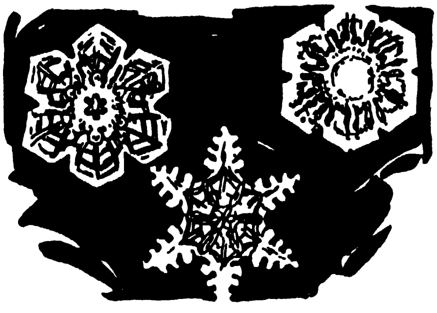
The electronic sewing machine "welds" seams in thermoplastic materials. Anyone interested in manufacturing this instrument can obtain information by simply writing to RCA, RCA Building, Radio City, New York 20, N. Y.

RADIO CORPORATION of AMERICA

CLIMATOLOGY

NATURE RAMBLINGS

by Frank Thone



Fragile Individualists

➤ SNOW CRYSTALS by billions have fallen from gray skies through all the millions of winters this old earth has seen. Yet it is most probable that no two in all those countless hosts have ever been exactly alike. Certainly no two snowflakes in the many thousands that have been examined by scientists have ever been identical.

There is, indeed, easy enough chance for infinite variety in the manner in which snow crystals are formed. They start as raindrops start, with the attachment of water molecules to electrically charged nuclei in the clouds. These nuclei may be almost any kind of particle—microscopic grains of dust, minute salt crystals; anything, in short, that can accumulate an electric charge. They differ from forming raindrops, of course, in that the change is from water vapor to the solid, or ice, phase rather than to liquid.

Basic crystal pattern of solidifying water is a hexagonal plate. The first few molecules electrically seized by the nuclei presumably arrange themselves in a six-sided pattern. But water molecules are exceedingly minute, and by the time some hundreds of millions of them have assembled to form even a little snow crystal the interplay of forces in even that small frame of action can have worked out a pattern that has never existed before.

There are, however, certain family resemblances among snow crystals, which you undoubtedly have noticed even if your study has been no more ambitious than a casual glance at the bits of white that fall on your coat. Some of the fragile jewels of the snow are exceedingly intricate and lacy in outline, others are of a more severely simple pattern, still others are intermediate in the elaborateness of their structure. Very rarely are two classes of crystals seen during the same snowstorm.

Meteorologists say that the delicate filagree patterns are formed in low-hanging clouds where relative humidity is high and temperatures not far below freezing. The smaller, more severely simple crystals are formed at greater heights where temperatures are much lower but where there is less free moisture. You may recall from your own experience how these Spartan patterns are seen as a rule during the coldest snowstorms, when some share of the cold aloft is also felt down at ground level.

Science News Letter, January 11, 1947

TEXTILES

Chemicals Protect Textiles From Mildew and Mold

➤ YOU CAN TAKE your choice of a variety of chemicals to protect household draperies, shower curtains and awnings from mildew and mold. The information is available from the Office of Technical Services, Department of Commerce.

Numerous chemicals were found to be effective in preventing deterioration of textiles over a wide range of tropical conditions. They include copper 8-hydroxy quinoline, pyridyl mercuric stearate and chloride, copper naphthenate, and copper ammonium fluoride.

Experiments with over 15,000 samples of textiles and other materials were conducted at a test station in the Canal Zone. Over 4,500 living fungus cultures and 1,100 bacteria samples were assembled for the tests.

Science News Letter, January 11, 1947

ASTRONOMY

Eclipse Tells of Stars

Existence of sun's corona revealed through total eclipse. Eclipse of double stars shows their size, shape and temperature.

➤ ECLIPSES of the sun and the stars tell us much about these heavenly bodies that would otherwise escape our attention, Dr. Henry Norris Russell, Princeton University astronomer, stressed in the first of a series of lectures to be given annually and named after him. Dr. Russell spoke at the annual meeting of the American Astronomical Society, meeting in Cambridge with the American Association for the Advancement of Science.

Total eclipses of the sun made us aware of the existence of the sun's corona, Dr. Russell pointed out. Double stars that revolve in or nearly in a plane along our line of sight are among the most important and best-known. Changes in their light and spectra during periodic eclipses furnish many clues to their sizes, shapes, temperatures, rotations and nearness together. Some of these eclipsing stars are so close together they are practically in contact and have an hourglass shape.

Contributions for the Henry Norris Russell lecture fund were made by nearly 300 individuals and organizations in recognition of the leading part Dr. Russell has played in the advance of science for the past half century. He has served as synthesizer of theories and observations in all phases of astronomy; lately he has acted as the world's outstanding critic of new theories.

Dwarfish stars like our sun, waltzing through space in well-mated pairs and sometimes dancing cheek-to-cheek, are the most common type of eclipsing stars.

Such close pairs of sun-like stars are at least 25 times as numerous per volume of space as eclipsing binaries of all other kinds, Dr. Harlow Shapley of Harvard Observatory told the meeting. Their relative frequency in the star population, at least in this part of galactic systems, is much higher than that of other types of eclipsing stars.

The fact that low-luminosity yellowish eclipsing systems of the W Ursae Majoris type are so numerous is important in unraveling the mystery of how double stars come into being. It suggests a distinct genetic difference between these close ellipsoidal pairs which are frequently in superficial contact, and the more commonly studied eclipsing pairs of unequal components and great spectral variety.

Some caution must be exercised in estimating their frequency per unit space, Dr. Shapley warned, because there is a faint possibility that some such variables may belong to a certain subgroup of cluster-type variables that have similar periods and light curves. The groups may eventually be segregated by careful study of their color-indices: the sun-like variables are considerably redder as a class than Cepheid stars that have frequent variations in brightness.

Double stars that are close together are often freaks.

While the masses of the heavier components of close binary systems are approximately normal for their spectral characteristics, Dr. Otto Struve of the Yerkes and McDonald Observatories stated, when the pairs are close together they are abnormally small in size. The secondary components as a rule not only are abnormally large, but sometimes they have an abnormal mass and luminosity.

The mass of one star of an eclipsing system may be five, ten, 20 times as great as that of its companion, or it may be even more, Dr. Struve said in reporting on the work carried on during the past three years by University of Chicago astronomers at the McDonald Observatory of the University of Texas. In all double stars they found that the stars rotate in the same direction as that in which they move their orbits.

By determining the physical characteristics of close double stars, the astronomers hope to throw new light upon the old problem of the origin and evolution of eclipsing binaries.

Science News Letter, January 11, 1947

Books of the Week

ANALYTICAL GEOMETRY AND CALCULUS—Henry B. Phillips—*Addison-Wesley*, 457 p., illus., $6. A text which provides a course in analytical geometry and calculus for students of science and engineering.

AUDIO-VISUAL METHODS IN TEACHING—Edgar Dale—*Dryden*, 546 p., illus., $4 25. This volume has been planned as a textbook and as a tool for teachers-in-service. It discusses the "Why", "What" and the "How" of audio-visual materials.

BIBLIOGRAPHY ON CORK OAK—Compiled by R. C. Watrous and H. V. Barnes—*Govt. Printing Office*, 66 p., 15 cents. U. S. Dept of Agri. Bibliographical Bul. No. 7, April 1946.

COSMIC RADIATION—W. Heisenberg, Ed.—*Dove*, 192 p., illus., $3.50. Fifteen articles on recent accomplishments in this field, written by German physicists during World War II.

CROW SHOOTING—Bert Popowski—*Barnes* 216 p., illus., $2.50. A book that tells about the habits and idiosyncrasies of the crow and gives expert detail on how to hunt him.

FUNCTIONAL ANATOMY OF THE MAMMAL A Guide to the Dissection of the Cat and an Introduction to the Structural and Functional Relationship Between the Cat and Man—W. J. Leach—*McGraw-Hill*, 231 p., illus., $2.50. Emphasizes structural similarities and differences between the cat and man.

MANUAL OF ELECTROENCEPHALOGRAPHY FOR TECHNICIANS—Robert S. Ogilvie—*Addison-Wesley*, 100 p., illus., $5. A work book covering the techniques and operational phases of modern electroencephalography. It is of particular value to neurologists and psychiatrists.

THE PATH OF SCIENCE—C. E. Kenneth Mees—*Wiley*, 250 p., $3. A book which deals with the growth of science through the ages and its relations to society today.

THE PUMA: Mysterious American Cat—Edward Goldman—*American Wildlife Institute*, 358 p., illus., $4. A monographic study of a distinctly American animal.

SCIENCE AND FREEDOM—Lyman Bryson—*Columbia Univ. Press*, 191 p., $2.75. A discussion of the use of the scientific method in understanding human behavior and the application of scientific knowledge to the management of human affairs

SCIENCE AND LIFE IN THE WORLD—Science and Civilization—The Future of Atomic Energy—*Whittlesey House*, 152 p., illus., $2.50. A collection of ten addresses by leading scientists and educators dealing with many of the serious problems facing the world today. Westinghouse Centennial Series, Vol. I.

SCIENCE AND LIFE IN THE WORLD Transportation—A Measurement of Civilization—Light, Life, and Man—*Whittlesey House*, 236 p., illus., $2.50. This volume covers two phases of life—Transportation as related to social development, and biological science with its implications for present and future human development. Westinghouse Centennial Series, Vol. II.

SCIENCE AND LIFE IN THE WORLD A Challenge To The World—*Whittlesey House*. 198 p., illus., $2.50. This book covers all remaining Centennial Addresses, together with a short account of the life and accomplishments of George Westinghouse. Westinghouse Centennial Series, Vol. III.

SCIENCE SINCE 1500: A Short History of Mathematics, Physics, Biology—H. T. Pledge—*Philosophical Library*, 357 p., illus., $5. A survey of the growth of modern science during the last 4 centuries.

WOOD YEAST FOR ANIMAL FEED—*Northeastern Wood Utilization Council*, 198 p., $2. Bul. No. 12, Nov. 1946.

Science News Letter, January 11, 1947

HEALTH

Eat Less to Live Longer and To Escape Some Diseases

➤ EAT LESS and you will live longer and perhaps escape cancer and chronic diseases of lungs and kidneys. You will, that is, if man's body and organs respond to calorie-restricted diets as do rats.

Warnings against the dangers of overeating and overweight were given by two nutrition authorities at the American Public Health Association meeting.

Rats lived much longer if during their growing period they were kept on diets adequate in known essentials, such as minerals, vitamins and proteins, but restricted in calories, Dr. C. M. McCay, Cornell University professor, reported.

The longer life span for the rats was due in part to slower development of chronic diseases in the lungs of rats whose growth was retarded by diets low in energy value. Such diets and the slower growth also lead to a much lower occurrence of tumors and possibly to less aging of special organs such as the kidney and lungs.

The major nutritional problem of the United States, from the public health viewpoint, is the disregard of the impairment to health that comes from overeating, Dr. Frederick J. Stare of Harvard declared.

The people should be warned of the danger of overweight, he stated.

Science News Letter, January 11, 1947

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Absolutely no math background needed if you have the **PRACTICAL SLIDE RULE MANUAL** by J. M. Klock, formerly Mathematician for the U. S. Navy and Instructor in the Detroit Public Evening Schools. An absolutely non-technical explanation of how to use a slide rule for the fundamental math calculations. **STUDENTS** of all math, science, and technical subjects will find the use of a slide rule to be a great aid in their work. **SHOP AND TECHNICIANS:** special applications made to formulae from mathematics, engineering, aeronautics, air navigation, etc. The slide rule gives rapid solutions to all the basic formulae. **OFFICE:** and business administration applications are numerous. The slide rule is especially valuable in per cent and interest work, and cost accounting. The booklet includes chapters on these subjects. The slide rule is also a valuable rapid estimator.

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FIRE BLANKETS, for emergencies in factories, laboratories and homes, can be used to smother flame. They are made of strong glass cloth, impregnated on both sides with synthetic rubber.

Science News Letter, January 11, 1947

FLOW METER accurately measures the air flow through an automobile engine that gives the necessary crankcase ventilation and removes gases escaping past piston rings. Used under actual operating conditions, it measures both the flow of air entering the engine and the total outlet flow.

Science News Letter, January 11, 1947

GAS COLLECTOR, used in an automobile plant to prevent exhaust gases from escaping into the air while engines in assembled cars are being tuned, is a scoop that rises automatically from the floor to cover the exhaust pipe. An electric eye actuates a mechanism that raises the scoop and draws the gases away.

Science News Letter, January 11, 1947

SALT AND PEPPER shakers drop a measured amount of the seasoning each time the top is pressed. Non-clogging in damp weather, they are made of a plastic that has enough heat-resistance for them to be put on top of a stove without injury.

Science News Letter, January 11, 1947

SELF-SERVICE booths in a music store, where records may be tried without disturbing other people, are open stalls with ordinary phonograph disks for the records and telephone receivers for the listeners. Only one person hears the record with the arrangement shown in the picture.

Science News Letter, January 11, 1947

EYE-TESTER, for visual performance only, determines individual sight characteristics. These include depth and sharpness of visual perception, eye muscle balances, and color. In the device are used a series of checkerboards, lines crossing a flight of stairs, arrows pointing to numbered dots and colored circles.

Science News Letter, January 11, 1947

WIRE NAIL, with parallel grooves cut around its shank, holds like a screw in railroad car and truck bodies under severe vibrations on the road. These sharp holding grooves are set at angles so that they do not disrupt the fibers of the wood when driven in.

Science News Letter, January 11, 1947

DISPLAY compartment, attachable to the rear side of an automobile visor, makes it possible to keep a road map or reminder list in constant view of the driver. The map or list is held flat by a transparent plastic front that also protects it from dust.

Science News Letter, January 11, 1947

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 344. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.*

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Question Box

AERONAUTICS

How are fogs burned from airport runways? p. 27.

What devices are used for all-weather flying? p. 26.

ASTRONOMY

For what will the new tunable filter be used? p. 23.

Where is the red "coronium" spectrum line of light? p. 18.

BACTERIOLOGY

How will germs increase the yield of oil? p. 24.

BIOLOGY

What two researches split the AAAS prize? p. 19.

CHEMISTRY

What chemical can reduce stable organic compounds? p. 23.

EVOLUTION

Which came first, the egg or the chicken? p. 21.

METEOROLOGY

How do snow crystals start? p. 30.

MEDICINE

How does hemoglobin aid penicillin? p. 18.

PHYSICS

What is the heart of the crystal clock that broadcasts time to the world? p. 22.

PLANT PHYSIOLOGY

What is the first product of photosynthesis? p. 20.

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SCIENCE NEWS LETTER

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NUTRITION

Synthetic Vitamins Help

Dr. Robert R. Williams, vitamin researcher, tells role of synthetic vitamins on receiving the Perkin Medal. They should improve staple foods.

➤ SYNTHETIC vitamins may help save mankind from the Malthusian disaster of increasing faster than its food supply can, Dr. Robert R. Williams, noted vitamin researcher and director of research of the Research Corporation, declared on receiving the Perkin Medal.

The medal is awarded jointly by the Society of Chemical Industry, the American Chemical Society, the American Institute of Chemical Engineers and the Electrochemical Society.

The synthetic vitamins can play their part if used to make more nourishing the staple foods of the world, as white flour in the United States is made more nourishing by enrichment with synthetic vitamins, Dr. Williams explained.

He termed "perfectionists" those who argue for use of whole grains rather than fine milling which removes vitamins that have to be restored to make the product as nourishing as the original.

"If one were feeding dumb animals which are without means of effective protest this might well be the answer," he said. "Humans, however, will normally eat what they like and raise hell if deprived of it."

Enrichment of white bread and flour, at a cost of about 20 cents per capita, he regards as cheap insurance for substantially all Americans against deficiencies of the nutrients added.

On the subject of taking vitamin pills, he pointed out that they are "harmless and we can safely leave to the public to decide how much benefit it derives and how much it is willing to pay for them."

"Many scientists use them and feel that they benefit from them," he added. "It is folly to assume blandly that human diets are quite adequate without them."

Anyone who thinks his own diet is adequate should try feeding it to rats, he suggested. The experimenter is almost certain to find that the rats fail to reproduce in the second or third generation.

A number of antivitamins are now known, he reported. Sulfanilamide was the first of these to be discovered. An antivitamin is believed to exist in corn which fakes the role of nicotinic acid but cannot do the work of this vitamin in preventing pellagra, long known to afflict persons living largely on corn.

Science News Letter, January 18, 1947

ASTRONOMY

Photocells Reveal Heavens

➤ MANY DETAILS of the heavens, never seen by man, can now be revealed through the use of photocells sensitive to red light far beyond the region visible to the human eye or that detectable by the best photographic plate. These cells will help us lift the veil that now hides some of the secrets of our universe behind interstellar clouds and will enable us to observe invisible or "dark" stars.

We may "see" many details of the Milky Way system, previously hidden, through use of lead-sulfide cells, effective in the infra-red region of the spectrum far beyond where the human eye can penetrate, Dr. A. F. Whitford of the Washburn Observatory, University of Wisconsin, reported to the American Astronomical Society—Harvard Observatory Centennial in Cambridge.

The lead-sulfide photoconductive cell developed during the war by Dr. R. J. Cashman of Northwestern University is sensitive out to a region whose wavelength is five or six times that of yellow light, and two or three times that of useful infra-red-sensitive photographic plates, Dr. Whitford stated.

"Cool" stars only a few hundred degrees hotter than a flatiron can be examined with this instrument in that part of the spectrum where they shine best, for only a very small percentage of the energy from these stars is in the form of visible light. The cell's sensitivity to infra-red light may give important data on the nature of interstellar dust particles through a study of their effects in reddening the light from distant stars.

Water vapor in the earth's atmosphere absorbs great chunks of the star's infra-red energy, but by "looking between the slats in the picket fence," useful observations can be made in the clear regions. The ability of infra-red light to penetrate haze has already been used to see the dim outlines of the distant nucleus of our galaxy which, though known for many years to exist, had always been invisible because of the interstellar dust clouds that blot out the ordinary light it emits.

Science News Letter, January 18, 1947

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ENGINEERING

Plastics Aid Building

New resins and techniques make plastics important in the building industry. Many are made from wood waste and are not a threat to the lumber business.

➤ THE HALF MILLION tons of plastics now made each year in the United States do not yet constitute a threat to the 5,000,000 tons of lumber and the 45,000,000 tons of brick, cement and building blocks used in the building industry, but new plastic products, using new resins and new techniques, are rapidly becoming more important.

The threat to lumber is not a serious matter to lumbermen, because many of the new building plastics will be made of wood waste such as sawdust, shavings, chips and sideslabs now used, if used at all, for fuel. Farm wastes will also constitute a source of raw material for building plastics, wastes such as cornstalks, corncobs, wheat, straw and sugar cane.

In a recent report of the National Bureau of Standards on plastics and the building industry, Dr. G. M. Kline, chief of organic plastics section, points out some of the new materials and techniques which he says are destined to bear great significance in the building industry. The low-pressure molding processes developed during World War II are of particular importance in the economical production of plastics. They discard the prewar high-pressure machinery, high temperatures, and costly steel molds, and use low-pressure techniques, low temperatures and wood or concrete forms.

The factor that made this reduction in pressure for molding possible is the development of resins which will cure without giving off water. Released water tends to form blisters. The new resins, called polyesters, cure or harden by cross linking through unsaturated carbon-to-carbon bonds, rather than by splitting out water.

The application of the low pressure to flat pieces of plastics for sidewalls, partitions and floors is relatively simple. For shaped forms, special technique is required. The material is made thermoplastic by heat and quickly formed over a mold. Then flexible rubber sheets or bags are forced into contact with it by evacuation, or mild air, or steam pressure in an autoclave.

This new technique has removed the size limitations which presses and steel molds had placed upon molded plastics applications. Domes for radar housing, eight feet high and eight feet in diameter, are easily made in one piece from glass fabric impregnated with polyester resin. Wings for airplanes have been made by the same method. The upper and lower surfaces are formed separately, and then joined together.

Plywood, a familiar structural material for inside work, is now suitable for exteriors, thanks to the use of phenolic resin as the adhesive which gives a bond that is weather and fungus resistant. The casein glue formerly used is not resistant to alternate wetting and drying, and is very susceptible to deterioration by mold growth.

Because of the many new plastics now appearing, a program is under way at the National Bureau of Standards to cooperate in setting up consumer standards for various plastic products. This will assist buyers in getting suitable material for particular applications.

Science News Letter, January 18, 1947

STRENGTH TEST—The tensile strength of a plastic specimen is measured at the National Bureau of Standards. The sample's elongation under tensile force, applied by a universal testing machine, is measured by an extensometer and recorded automatically on a chart.

ANTHROPOLOGY

No American Race Exists

➤ THERE IS no "American race," but an anthropologist has found at least five outstanding types of Americans representing different sections of the country. Dr. Alice M. Brues, working at Harvard University during the war, analyzed the physical types of GI's to help the Chemical Warfare Service design gas masks.

Here is the way Dr. Brues classified the "American types":

1. A tall, thin-faced narrow-headed type, commonest in those of British extraction and typical of the South.

2. Tall, like the first, but with a wider face and head are the typical persons of Scandinavian extraction, found mainly in the West North Central States.

3. Common mainly in the Middle Atlantic and East North Central States is a short type, round-faced and with a broad head, typical of German, Russian and Slavic extractions.

4. Short, like the third, but with a narrower head is the typical type of French and Mediterranean extraction, common in New England.

5. Found mainly in Texas and Oklahoma is the type indicative of Indian admixture, distinguished mainly by a broad face, out of line with any of the European extractions.

Writing in the *American Journal of Physical Anthropology* (Dec.), Dr. Brues indicates that the "average American" may be of Irish extraction. The Irish, she reports, could not be classified as they are common in all parts of the country and hit the dead center of the American average in their measurements.

The anthropologist measured the head and face size of 3,000 soldiers gathering data for design of gas masks. She found that the famous American melting pot, despite the reduced immigration of the past two decades, has failed to produce an American race. The imprint of the physical differences long existing in Europe, she concludes, are still on the American people.

Science News Letter, January 18, 1947

GENERAL SCIENCE

Science in the Budget

Truman's plan would postpone the organization of any science foundation, urged by scientists of the American Association for the Advancement of Science.

➤ THE ESTABLISHMENT of a National Science Foundation or its equivalent is recommended by President Truman in his budget message to Congress as a "central agency to correlate and encourage the research activities of the country."

"While freedom of inquiry must be preserved," the message says, "the federal government should accept responsibility for fostering the flow of scientific knowledge and developing scientific talent in our youth."

While again recommending the National Science Foundation to Congress, the President calls attention to the fact that the Scientific Research Board which he appointed under Reconversion Director Steelman in October is making a study of governmental research activities.

The Presidential message suggests that this report will be of service in "establishing a proper program for the new agency." The message also states that "it is assumed that no additional expenditures will be required during the fiscal year 1948."

If this procedure were followed, it would postpone the organization of any science foundation until the middle of 1948 or one and a half years hence.

This will come as a shock to many scientists who are now organizing under the leadership of the American Association for the Advancement of Science an intersociety committee to aid Congress in considering at the present session of Congress some sort of science foundation.

While national science foundation bills were failing to pass the last Congress, the military departments, particularly the Navy, stepped in and gave extensive grants for basic research to university and other laboratories.

The Office of Scientific Research and Development which did major war research will be almost completely liquidated by the middle of this year, the message points out.

While detailed figures are not given in the budget, intense prosecution of scientific research and development for the National defense is contemplated in the recommended appropriations. This is one of the reasons for the high cost of the Army and Navy compared with the pre-war era, along with occupied areas, large forces, and extensive mechanized equipment that must be prepared.

Stock piling of strategic materials for any future war emergency will continue, with new purchases being made and large transfers from the RFC stocks to military stock piles.

Atomic energy expenditures in the year beginning next July 1 will be more than double the amount being expended this fiscal year, and this estimated expenditure of $443,000,000 for next year is explained in part by the fact that during post-war days of the Manhattan District, now transferred to the civilian commission, replacements and maintenance needed were not made.

The message renews recommendations for federal supplements to equalize educational opportunities and standards in the states. The government's relationship to higher education should have serious consideration, the President says, and a commission is studying the matter.

Science News Letter, January 18, 1947

PHOTOGRAPHY

Photo-Flash Unit Takes Fast Pictures

➤ AN ELECTRONIC photo-flash unit which fires photographic flashes faster than the average photographer can take pictures has been developed by the Navy.

The compact, light-weight unit is designed to operate at three-second intervals, firing 4,000 flashes without changing batteries. The new unit produces more than 10,000 flashes with a single bulb and consumes less electricity for 10,000 flashes than an average light bulb burning all day.

The electronic unit was developed by Brandt B. Conway of the Naval Research Laboratory Airborne Coordinating Group and the Research and Development Branch of the U. S. Naval Photographic Service, both at Anacostia, D. C. Mr. Conway is on loan to the Navy from the Philco Radio Corporation.

Standard service model of the photographic flash unit will weigh 11½ pounds and will fire 1,500 times, though provisions have been made to use batteries enabling photographers to get 4,000 flashes without changing batteries.

Exposure time for the flash with the electronic unit is 1/10,000 of a second with the total light equal to a medium size flash bulb. The light is triggered either with a manual button or a synchronizer for electrical triggering.

Navy photographic research work is now underway to adapt the new unit to trivision, the Navy's third dimensional photography.

Commercial models of the flash unit will be available at a later date, the Navy said.

Science News Letter, January 18, 1947

PUBLIC HEALTH

World in Better Health Than Expected After War

➤ "THE WORLD is in far better health today than we ever dreamed it could be so soon after the most widespread and devastating war in history," Dr. Wilbur A. Sawyer, internationally known health authority and director of the health division of UNRRA, declared.

UNRRA's health activities in Europe in connection with administration of the International Sanitary Conventions of 1944 have now been turned over to the interim commission of the new World Health Organization. WHO is also receiving from UNRRA some funds for carrying on these activities and UNRRA supplies still in European countries for controlling epidemics.

"Now that the main emergency is behind us," Dr. Sawyer stated, "the continuance of international disease control can confidently be left to the health departments in the countries themselves with the support of the new World Health Organization."

UNRRA health activities in China will be turned over to WHO on March 31.

"After World War I," Dr. Sawyer said, "there were tremendous epidemics of typhus fever, typhoid fever and other diseases. Following this war in which destruction and displacement of peoples was much greater and governmental health agencies were largely disrupted, there have been no major epidemics in Europe."

NINE FEET LONG—This model of the pirarucu, biggest fresh water fish in the world, is nine feet long. It is on exhibit at the Chicago Natural History Museum.

"Part of this accomplishment is due to the advances in medical science between the wars. Major credit should, however, be given to UNRRA for getting health departments on their feet and for supplying them with enormous quantities of effective new drugs and insecticides such as penicillin and DDT.

"Phenomenal results were obtained in Poland in the suppression of typhus with DDT powder and in Greece in a nationwide attack on malaria by airplane sprayings of marshes and hand spraying of houses and small streams with DDT."

Science News Letter, January 18, 1947

ENTOMOLOGY

Tires Hide Stowaways

Pacific island mosquitoes have ridden to this country in tires and shell cases. DDT is on the job to prevent the spread of disease.

➤ HUNDREDS of thousands of Pacific island mosquitoes, some of them potential disease carriers, have been coming to this country in tires and perhaps also in shell cases and amphibious vehicles returned from combat areas by the Army and Navy.

The stowaways were first detected by Sanitary Inspector John L. Chambers of the U. S. Quarantine Station, Port of Los Angeles. During a routine Public Health Service quarantine inspection of a cargo ship from the New Guinea area, he noticed several live adult mosquitoes in one of the holds of the ship. Crew members also complained to him that they had been annoyed by mosquitoes for five or six days after leaving port.

"An investigation revealed that mosquitoes were breeding heavily in fresh water contained in motor vehicle and aircraft tires which constituted a large part of the cargo," Assistant Sanitarian John J. Pratt, Jr., Dr. Robert H. Heterick and Dr. John B. Harrison of the U. S. Public Health Service and Capt. Louis Haber of the U. S. Army Sanitary Corps report in the Military Surgeon.

"It was estimated that approximately one half of the 8,880 tires aboard contained water varying in amount from one cup to five gallons per tire and that a large proportion of these contained living mosquito larvae. It is conservatively estimated that the average tire examined contained from 20 to 30 larvae."

Before the ship docked, all openings leading into the holds were closed and each hold was thoroughly sprayed with freon-pyrethrum aerosol. Many dead adult mosquitoes were recovered from the holds after spraying. Later a disinfestation squad was stationed on the dock warehouse loading platform armed with knapsack sprayers containing 5% DDT in kerosene. As the tires were unloaded and rolled into freight cars they were quickly inspected for water. Those found containing any were sprayed with DDT. This avoided delay in moving tires from ship to cars for trans-shipment. The cars were also thoroughly sprayed before the tires were loaded against any adult mosquitoes that might emerge in transit from any larvae or pupae not killed when the tires were treated.

Some of the mosquitoes were identified as carriers of dengue fever and filariasis in their native Pacific islands. Some were not known as carriers of human diseases, though there is always a possibility that such mosquitoes may become carriers in a new environment. In 11 subsequent shipments of tires, water was found in eight and mosquitoes were found breeding in three of the shipments. Amphibious vehicles were also found to contain water, but no mosquitoes were found breeding in them. All material which contained water was routinely treated with DDT in kerosene.

Science News Letter, January 18, 1947

ICHTHYOLOGY

Biggest Fresh Water Fish Grow to 15 Feet Long

➤ THIS WEEK'S fish story, authenticated by the Chicago Natural History Museum:

Down South America way, in the Orinoco river, relatives of the herring grow to be 15 feet long. The pirarucu is the largest fresh water fish in the world.

Proof: Taxidermist Leon L. Pray has mounted a nine-foot model of this giant fish for public admiration. That 15-foot size is admittedly of one that got away, presumably, as the Museum put it down as an "unverified report" worth repeating however.

This story has teeth in it. The pirarucu has a bony tongue and natives collect the rasp-like teeth covering the tongue and use them to grate coconuts and roots for their dinner tables.

Science News Letter, January 18, 1947

AERONAUTICS

Engine Trouble Analyzer To Make Flying Safer

➤ SAFER FLYING is promised by a new engine trouble analyzer that enables the flight engineer during flight to locate improper operation that might cause engine stoppage so that repairs can be made on landing.

The 90-pound device, installed in transports, detects operating difficulties in the ignition system, fuel injection system, and hydraulic or electrical accessories. It also detects lack of magneto or engine synchronization, engine roughness, and even makes a vibration analysis of combustion, detonation, and valves and fuel injection seating in a selected cylinder.

This new engine trouble analyzer was revealed to the Society of Automotive Engineers by John Lindberg, of Pan American Airways, N. Y., and Clifford Sackett of the Lindberg Instrument Company, Piedmont, Calif. They described it as a graphical indicator employing electronic methods to create graphs of magneto primary voltage and of cylinder vibration pickup voltage, also of engine timing degrees. It is sensitive enough to locate a fouled sparkplug.

Science News Letter, January 18, 1947

SEISMOLOGY

Dam Reservoir Creates Man-Made Earthquakes

➤ MAN-MADE earthquakes, more than 4,000 small tremors, have been recorded at Lake Mead, the giant reservoir created by Boulder Dam on the Colorado River. Caused by the adjustment of the earth's surface to the weight of 40,000,000,000 tons of water in the lake, the quakes are so slight that only a few could be felt by human beings.

As recorded on seismographs of the U. S. Coast and Geodetic Survey, the more than 4,000 man-made tremors add up to a total force of about 1% of that of one destructive natural quake, the Bureau of Reclamation of the Department of Interior reports.

Scientists say that the numerous but small shocks are no threat to Boulder Dam, because the quakes are associated with natural geological faults in the earth. The extra load on the earth from an artificial lake is big enough to cause minor tremors, but it is not great enough to cause new faults or produce severe earthquakes.

Most of the earth movements came in the first years after the dam was completed in 1936 and only a few have been noted since 1942. Meanwhile, it is estimated that the lake basin has settled several inches with respect to the neighboring mountains.

Data on the man-made tremors, reported in the Bureau of Reclamation's magazine, *Reclamation Era,* were collected by three strategically-placed seismographs. Other seismographs have been used to record local shocks from the reservoirs of Shasta and Grand Coulee dams.

Science News Letter, January 18, 1947

ASTRONOMY

Heavenly Atomic Explosion Occurred on Nova Persei

➤ DETAILS of a series of atomic explosions that occurred several decades ago have been worked out by Prof. Dean B. McLaughlin of the University of Michigan. Clouds of gas with speeds of from 500 to 2,000 miles per second rushed out from Nova Persei in 1901, a star far too faint to be seen with binoculars that within two days temporarily became one of the brightest stars in the heavens.

Eruptions on the star probably followed each other in rapid-fire order. What originally appeared to be one cloud of gases later showed up on the star's spectrum as three shells moving at different speeds. The main flow of gases, racing forth from the star at 1,000 miles per second, formed a shell around the star that today appears as a small nebula.

Science News Letter, January 18, 1947

AERONAUTICS

Encased Magneto Designed To Better Fit Aircraft

➤ HIGH-FLYING aircraft need something more than superchargers to stuff air more rapidly into the fuel ports. In the thin atmosphere at near-stratosphere altitudes there are apt to be troublesome corona discharges or flash-overs between parts of the magneto equipment. To obviate this, E. B. Nowosielski of Bloomfield, N. J., has designed an encased magneto with a pair of oil-sealed pumps that maintain normal atmospheric pressure within. Rights in the patent, No. 2,413,993, are assigned to the Edison-Splitdorf Corporation.

Science News Letter, January 18, 1947

IN SCIEN

CHEMISTRY

German Insecticide May Supplement DDT

➤ "BLADAN," an insecticide first produced in Germany during the war, may prove a useful supplement to DDT in some uses, entomologists of the U. S. Department of Agriculture state.

For example, DDT is not effective against certain species of mites and aphids that attack apples, though it does a good job of killing codling-moth larvae. So field tests of the two insecticides in combination are in order.

Bladan has hexaethyl tetraphosphate as its active principle. It has an advantage over DDT in that it is easily soluble in water; but offsetting this is the fact that it deteriorates quickly and hence does not have the long-lasting residual effects of DDT.

Science News Letter, January 18, 1947

PALEOBOTANY

Devonian Parasite Killed By Other Parasitic Fungus

➤ "A KILLER KILLED" might have been the headlines in the Devonian Daily News on a story covering a picture shown at the Princeton University Bicentennial Conference on Genetics, Paleontology and Evolution by Dr. Henry N. Andrews, Jr., of the Missouri Botanic Garden.

In a specimen of one of the oldest of known land plants, dating back some 300,000,000 years to Devonian geologic time, Dr. Andrews found what appears to be the spore-case of a presumably parasitic fungus. But instead of being filled with its own spores it contains a lot of smaller spore cases of a different fungus. The parasite had been parasitized.

Dr. Andrews used an exceedingly careful chemical technique to get the actual plant remains out of a certain type of fossils. Then he was able to handle them as if they were plants that had been plucked and pressed only a few weeks ago. He can even demonstrate the presence of such fine details as the chloroplast, tiny green bits of living stuff that give plants their color even though long since dead and faded.

Science News Letter, January 18, 1947

E FIELDS

CHEMISTRY

New Alloys Increase Uses for Aluminum

➤ NEW ALUMINUM alloys, containing small amounts of beryllium which increases their tensile strength, were revealed by General Electric research laboratory. They open new fields for aluminum uses.

Their resistance to being pulled apart is from 30% to 80% greater than present commercially-available aluminum casting alloys, it is claimed. They resist corrosion, have high thermal stability, and can be both cast and wrought.

Zinc alloys containing beryllium, developed by GE during the past year, possess spring qualities comparable to brass and have other qualities that make them more usable for many applications than the present commercially-available wrought-zinc alloys.

A process for brazing ceramics to metal is important, particularly in the vacuum tube field. In this method, the ceramic is coated with titanium by heating in pure dry hydrogen or in a vacuum, then applied to the metal and brazed with copper by heating again in hydrogen or a vacuum.

Science News Letter, January 18, 1947

POMOLOGY

Frost-Dodging Apple Tree Blossoms One Month Late

➤ A RELUCTANT apple tree, that blossoms a month later than its orchard-mates and thereby escapes late spring frosts, is announced through the medium of the U. S. plant patent 722, issued to its originator, Max Bazzanella of Mineral, Va. The tree originated as a seedling on his farm in Louisa County, Va., about 15 years ago, and has been in bearing for a decade. Mr. Bazzanella states that he has propagated it by bud-grafting, and finds its cions true to the parent type.

The medium-sized fruits are described as spicy and sub-acid, with a quince-like flavor. The originator regards the new variety as especially suitable for drying and for general home use.

Science News Letter, January 18, 1947

TEXTILES

English "Terylene" Is Strong Synthetic Fabric

➤ ANOTHER new fiber will take its place along with rayon and nylon in clothing and other fields and may become as widely used. Its trade name is "Terylene," and it was developed by chemists of the Calico Printers Association of Manchester, England.

Terylene is claimed to differ from all other fibers yet produced. Textiles made of it are described as resembling silk. They can be washed, ironed and pressed without special precautions. The fiber can be very fine, or coarse if great strength is desired. It is resistant to heat and light and can be woven or knitted.

The new fiber is derived from terephthalic acid and ethylene glycol, both synthetic substances. Ethylene glycol, an antifreeze liquid, very similar to glycerine, is made by passing ethylene into chlorine water and treating the product with a base such as sodium hydrate. Terephthalic acid is a petroleum derivative.

Science News Letter, January 18, 1947

ENGINEERING

Lighter Automobiles Must Meet Flood of Foreign Cars

➤LIGHTER automobiles must be built in America if an incoming flood of foreign cars is to be curtailed and if foreign markets are to be supplied by us with the light-weight vehicles demanded abroad.

This is the opinion of W. D. Appel, of Willys-Overland Motors, expressed to the Society of Automotive Engineers. Really light-weight cars can be built, he said, if the aesthetic takes second place to the functional.

Using light metal alloys and designing smaller cars are two ways suggested. Others include simplifying the design to eliminate machining operations, using higher stresses, and combining several functions in a single part. The body, the heaviest single unit, can be drastically lightened.

Better heating of automobiles for passenger comfort was urged by Lewis A. Rodert of the U. S. National Advisory Committee for Aeronautics, who suggested the adaptation of two aircraft heating methods to road vehicles.

In one system, air enters an intake scoop, passes through a filter and heater, and is then circulated through the panels of the side walls, heating by radiation and convection. In the other, a heater mounted at the rear of the car would force air from vents downward over the car windows, passing out by vents in the floor. Either method would keep the interior at comfortable temperature and humidity and prevent fogging on the windshield.

Science News Letter, January 18, 1947

OCEANOGRAPHY

Pacific Floor Has Many and Deep Holes

➤ THE OFT-SUNG assertion, "There's a hole in the bottom of the sea," stands in need of revision, so far as the western Pacific is concerned. There are a number of holes, and they are much deeper than anybody suspected, a wartime echo-sounding survey disclosed. It was presented before the meeting of the Geological Society of America by Prof. H. H. Hess of Princeton University.

The sloping sides of these great deeps are marked by great arches of warped bedrock hundreds of miles in length, forming veritable submarine mountain chains. Topmost peaks of these drowned ranges emerge as small islands.

There is also a great lava plateau, separating the north Pacific basin from the western island arc groups that include Japan, the Philippines, the Mariannas and other smaller archipelagoes.

Science News Letter, January 18, 1947

MEDICINE

Colds Can't Be Prevented By Disinfecting Air

➤ HOPES that colds and other respiratory ills can be banished by disinfecting the air of public places are dashed by latest U. S. Public Health Service studies.

Dr. R. E. Dyer, National Institute of Health director, concludes that installation of equipment for treating air in theaters, shops, factories and offices is not warranted by present information.

Chemical treatment of air with glycol aerosols and irradiation with ultraviolet light have been tested over a number of years. Federal experts have been working on the problem since 1936. The National Research Council and the American Public Health Association also made studies and reports.

Science News Letter, January 18, 1947

CHEMISTRY

Cinderella of the Forest

Modern chemists are finding the bark of forest trees valuable in insecticides, glue, plastics and even fabrics. Barks also furnish medicine and flavoring.

By MARTHA G. MORROW

➤ CHEMISTS AND foresters seeking new uses for bark are not barking up the wrong tree. The thick bark of almost any forest tree, be it redwood, pine or Douglas fir, has been found valuable raw material for glues, plastics and insecticides.

Bark, which may compose up to 40% of the total volume of a tree, has long been considered worthless in logging. When poles, piling, saw logs and pulpwood are harvested, the bark is usually wasted. With little additional effort it can be saved if economically worth while to remove before milling.

Recent research may transform the bark of the great forest trees from a manufacturing nuisance into valuable raw materials. Already the bark of these gigantic conifers is being used commercially, with an increasing demand foreseen for the future.

Using Waste Bark

Bark has been reduced to its three principal components in a search for possible uses for this waste material. One resembles flaked cork. Another is a hard, fibrous tissue. The third is soft and powdery. They differ in chemical makeup and give promise of commercial possibilities.

A powder from bark has proved practical as a conditioner in many types of insecticide dusts, research conducted by the Weyerhaeuser Timber Company of Longview, Wash., showed. This bark dust is specially useful in insecticides that tend to become lumpy, making them flow more freely.

Combination of cork and fiber, another bark product, is used as an ingredient in molding compounds, base of modern plastics. When subjected to pressure and controlled temperature, it produces strong, hard shapes in a durable, inexpensive plastic.

Another bark product, combination of cork powder and fiber, has been found adaptable for use in a new, low-cost resin-base glue. It is used in manufacturing plywood and laminated wood. Following its release to manufacturers of plywood glue, demand for this bark product has exceeded production capacity of the plant.

While other uses for forest tree bark are still being investigated, findings to date are promising enough to justify installation of a bark processing plant, states Clark C. Heritage, technical director of the timber company.

No Finished Products

Here a carload of bark-based forest products will be produced daily. No finished products will be manufactured, however; the raw materials are to be sold to producers of glue, plastics and insecticides.

Finding uses for this waste material makes it feasible to remove bark before logs are sawed, with consequent savings in sawmill operations. At present the bark frequently is processed through the entire mill, only to end up in refuse burners. But practical uses are being developed for the bark to justify the expense of removing it before milling.

BARK FOR BACKS—Fiber from redwood bark, held by the young lady, was used in making the jacket she wears.

Unlike such timber trees as hemlock, pine, spruce and Douglas fir, a few trees are specially valued for their bark. The bark of one is used for insulation. Medicine is extracted from another and spice is made from the bark of a third.

Quinine, important ingredient in many remedies, is obtained from the bark of the cinchona tree, native to the Andean region of South America. The bark is always collected during the rainy season, when it is stripped more easily from the wood. The importance of this antimalaria bark was emphasized during the recent war when our troops were forced to operate in malaria-haunted tropics.

The earliest well-authenticated instance of the medical use of cinchona bark was in 1638 when the Countess of Chinchon, wife of the Viceroy of Peru, was cured of an attack of fever after taking the powdered bark. The genus was named for the Countess, whose name was misspelled in the process.

Cultivation of the cinchona tree has been attempted with varying degrees of success in Algeria, Ceylon, India and Java. The Java plantations, due to the industry of the Dutch planters and the chance discovery of a high-yielding strain, have been so successful as to enable the Dutch producers to establish a virtual monopoly in the field.

Cork Is Bark

Cork, used in bottle stoppers, is the outer bark of an oak closely related to the native liveoaks of our South and Southwest. The tree is native to the mountainous regions on both shores of the western Mediterranean—Portugal and Spain on one side, Spanish and French North Africa on the other.

The first crop of cork bark can be stripped off when the tree is 15 to 20 years old. Thick shells of bark are pried off in slabs from the trunk of the tree. A new crop may be removed about every ten years for at least a century.

The raw bark is put in big kettles or vats, weighted down and boiled vigorously for half an hour to soften it and remove water soluble materials. Next the rough outer surface of the bark is scraped off and the slabs stacked up to dry. The cork is then ready to be made into cork blocks needed for life belts and fishing net floats; corkboards for insulation in refrigerators and house walls;

composition cork for crown cap liners; and ground cork for heavy-duty linoleum.

Cinnamon, among the oldest spices known, is the inner bark of a tree native to the island of Ceylon. The natives cut down the tops of the trees that are still young. New slender stems grow out from the stump season after season, making them look like shrubs.

Only after the tree is about six years old are the branches peeled. This is done just after the heavy rains, when the trees are full of sap, so the workers can easily separate the bark from the stems without breaking it.

The branches to be peeled are cut close to the trunk, then scraped and the bark removed in long sections. As these dry, they curl and form the familiar cinnamon sticks.

Sassafras Bark

The first cargo of barks ever exported from what is now the United States included a large quantity of sassafras bark. This is used today, much as it was 300 years ago when shipped from Jamestown, in perfuming soaps and preparing scents and toiletries.

Fiber from redwood bark is blended with wool in making blankets, jackets and even felt hats. This reddish fiber is already widely used as insulation in houses and refrigerators, but its use in fabrics is relatively new.

In lumbering on the West coast where the redwoods grow, balls of felted redwood fiber were discovered in the bark shredding machines. This led to experiments to produce a "wool" fabric from redwood bark. The short, kinky fibers blend readily with sheep's wool and can be handled, napped and brushed. Separated by a machine, these fibers are blended with natural wool. The mixture is carded, combed and spun into yarn. Redwood fiber can replace 15% to 60% of the wool in some fabrics.

The earliest industrial use of any kind of bark was in tanning. The rough bark of oak, hemlock and chestnut was put right into the tanning pots with the raw hides. The tannic acid diffusing out into the water acted directly on the hides. Only within recent decades has tannic acid been extracted from the bark before using.

Today sumac bark also is used for tanning fine leather. In Australia tannic acid is extracted from eucalyptus and acacia trees.

Bark accumulating in large quantities at plants where tannin is extracted led to a search for uses for the fiber. It has been found useful as a filler in paper, cardboard, wallboard, roofing felt, composition shingles and for ornamental purposes in some types of wallpaper.

The search for new uses for bark continues. Bark, that may be ten inches or so thick on some trees, is expected to become the Cinderella of the forest as research points to new uses.

Finding new outlets for forest products is but one phase of the industrial program now under way for increasing the permanent usefulness of American forests. First, there is the growing of trees in greater abundance. Second, there is protection of forest growth against destruction by fire, insects and disease. Third, there is greater utilization of each tree. It has been generally accepted that less than half of a log delivered to a sawmill emerges as lumber. For the remainder there has been little or no economic use. Today this part of the picture looks increasingly bright.

Science News Letter, January 18, 1947

AERONAUTICS

Pusher Type Airplane Has Two-Bladed Propeller

See Front Cover

➤ A PUSHER TYPE of airplane, pictured on the cover of this SCIENCE NEWS LETTER, with its two-bladed propeller at the rear tip of its fuselage, is now ready for its first test flight. It is a five-passenger craft, with two engines inside the body to the rear of the passenger cabin, both of which operate the single eight-foot propeller working together, or either can do so working alone.

The new plane, still in experimental stage, is a product of Douglas Aircraft Company, and will be known as the Cloudster. It is an all-metal monoplane with a range of 1,100 miles and a speed of about 200 miles an hour. Its tricycle landing gear retracts into the nose and wings.

Power for the plane is furnished by two 250-horsepower Continental engines, mounted to use the aerodynamics principle of center-line thrust. Either engine can be cut in or out without affecting flight control. With one engine, the 35-foot long plane with a 40-foot wing span, can climb 600 feet per minute; with both in operation, the rate of climb is approximately 1,500 feet a minute.

Science News Letter, January 18, 1947

Two thin coats of *paint,* varnish, enamel or shellac are better than one thick coat when finishing furniture.

LOGGING—These logs are in a millpond headed for the saws. Some logs give up their bark easily during logging operations due to rough handling, but the majority cling to their coarse outer skin, making the job of "barking" no easy matter.

EVOLUTION

Smoky Industrial Cities Are Factor in Evolution

➤ SOOTY, smoky cities of the industrial age are apparently factors in evolution, Dr. F. E. Ford of the University Museum, Oxford, England, reported to the Conference on Genetics, Paleontology and Evolution. He has found two dark-colored variants of a common moth is the neighborhood of British cities, one of them nearly black, the other dark brown.

Science News Letter, January 18, 1947

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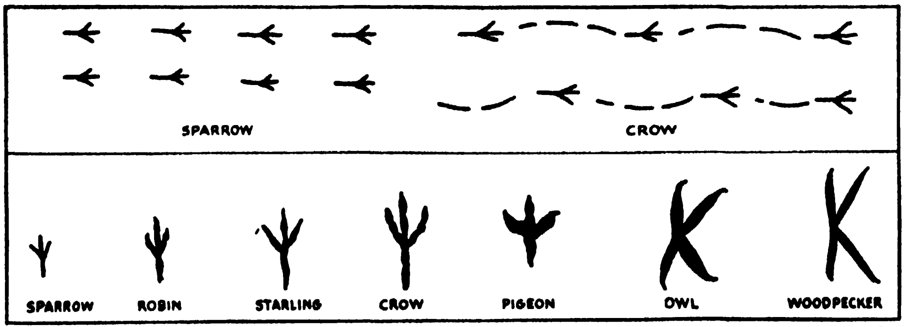

CALLING CARDS—Birds visiting a garden can be identified by the tracks they leave in the snow.

ORNITHOLOGY

How to Be a Bird Sleuth

Hopping birds leave a different kind of tracks from walking birds. Crows, robins, owls and pigeons all have distinctive foot prints that can be recognized easily.

➤ BIRDS VISITING your garden in search of food can easily be identified by the tracks they leave. Although such tracks can be found in sand or soil, they are seen most plainly in freshly fallen snow.

You do not have to live in the country to recognize the prints of wild creatures. In almost every garden and yard, however small, you can find the prints of a few birds, if you look for them. Visitors may come and go unknown to you, but they always leave their calling cards in the snow, states Richard Headstrom, who lectures at Boston's Museum of Natural History.

The lone print of a woodpecker at a feeding station may be a tell-tale sign that the bird made a brief appearance, but found nothing to eat and so flew off to more productive feeding grounds. The aimless tracks of a robin in the cold north may indicate the bird's dependence upon your generosity if he is to survive the winter.

Bird tracks at first look much alike, but with a little practice you can spot the all-important differences. The shape and size of the print, and the number of toes showing are characteristics which aid us in identifying bird tracks. Whether the tracks are in parallel pairs or staggered is also important, Mr. Headstrom states.

Small birds hop as a rule; thus their footprints fall in parallel pairs. Larger birds actually walk, leaving prints in a staggered line. A few birds, such as the robin, divide their locomotion almost evenly between hopping and walking.

The sparrow, a hopping bird, leaves paired prints. To identify these from the prints of other hopping birds, note that the side toes are commonly shorter than the middle ones. The size, too, is of some help, being about an inch long.

The toes of a crow are distinctive, the middle toe being definitely nearer to the inner than the outer toe. The crow's track is about three and one-half inches in overall length, with the hind toe print about one inch long. The prints may be paired or alternate, for the crow sometimes hops and sometimes walks. When walking, the toes usually drag.

The robin's toes commonly drag and the three front toes are evenly spaced. The prints may be either paired or alternate, but they are much smaller than those of a crow, being around two and a quarter inches in all. While a starling's tracks closely resemble those of a robin, they are about a quarter of an inch longer. The tracks are usually alternate.

A four-toed print, each print bearing the mark of a claw, is left by a domestic pigeon. Owls leave the same kind of print, but whereas the pigeon turns three toes to the front and one to the back, the owl turns two to the front and two to the back. Woodpeckers also turn two toes to the front and two to the back, but their toes are more slender than those of the owl and they do not leave prominent claw marks.

With a little study, it is possible to read bird tracks in the snow as readily as words on a printed page, Mr. Headstrom states. Full details are given in *Horticulture,* official magazine of the Massachusetts Horticultural Society.

Science News Letter, January 18, 1947

WAR BARGAINS in LENSES and PRISMS

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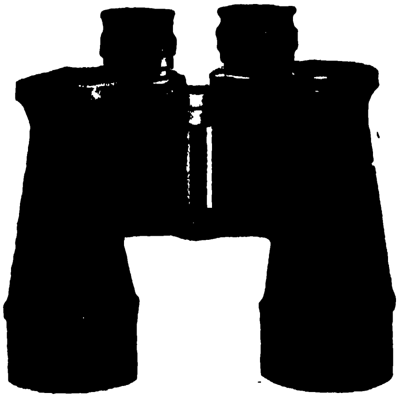

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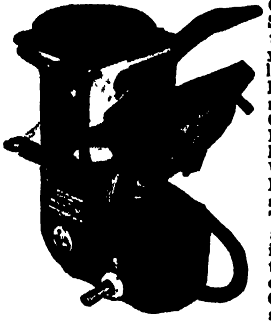

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ZOOLOGY

NATURE RAMBLINGS

by Frank Thone

Mysterious Cat

➤ THE PUMA or mountain lion often follows human beings, apparently out of sheer curiosity, but very seldom attacks without provocation.

Less than a dozen well authenticated cases could be found by Stanley P. Young and the late Edward A. Goldman of the U. S. Fish and Wildlife Service when they were gathering material for their book, *The Puma, Mysterious American Cat* ($4.), published by the American Wildlife Institute. And there is one case on record in South America of a puma saving a woman's life by driving off other predatory animals that were attempting to attack her.

The puma's record with relation to animals, both wild and domestic, is not so free from bloodstains. It is a big animal, and needs a lot of meat. One deer a week is its average ration, the authors state. It kills and eats almost all other kinds of wild animals, even porcupines and skunks. Its appetite for domestic animals, all the way from poultry to crows, has been its undoing, for it has now been wiped out over practically all of its former range in the eastern United States, and greatly reduced in numbers in the West. The same thing is happening to it in the settled parts of Middle and South America.

Few animals have such a variety of names. In addition to puma and mountain lion, it is called catamount, cougar, deer tiger, Mexican lion and panther. The colloquial "painter" is a corruption of the lattter name. The authors prefer puma because that was the name by which it was known to the South American Indians of the ancient Inca empire.

Science News Letter, January 18, 1947

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PALEONTOLOGY

Pre-Dinosaur Time Studied

Arizona fossils about 200,000,000 years old help fill in the picture of prehistoric life before the reign of the dinosaurs.

➤ A PICTURE of life in North America just before the reign of the dinosaurs is being formulated by University of California paleontologists from the fossil remains of beasts who stalked Arizona about 200,000,000 years ago.

The fossils, gathered at Meteor Crater and in the Painted Desert area, represent the first comprehensive evidence of life in North America for a 20,000,000 year period preceding the predominance of the dinosaurs.

This chapter of prehistoric life in North America, the lower Triassic epoch, covering the period from the end of the age of amphibians to the beginning of the age of reptiles, has long been missing. The fossils indicate that life in the Arizona area was similar to that long known in Europe and South Africa for the same period.

The Arizona fossils, collected over a 10-year period, have been described by Dr. Samuel P. Welles of the University of California.

Twenty skulls of large amphibian species were excavated from Meteor Crater. These take many forms, one being a peculiar beast known as aphaneramma, known previously only in Spitzbergen and Greenland. Aphaneramma had a long, slender snout and was about 18 inches long.

Dr. Welles described representatives of a group known as pseudo-suchians, found near Holbrook, Ariz. These were probably ancestors of the dinosaurs, reptiles which were developing bi-pedal characteristics. They stood three or four feet high, and had sharp, serrated teeth.

These prehistoric beasts inhabited a swampy flood plain, near sea level, which existed in Arizona about 200,000,000 years ago. To the west of the plain lay the ocean.

Some of these reptiles developed into dinosaurs, ranging in size from chickens to such beasts as brontosaurus, which was nearly 100 feet long, Dr. Welles said. The dinosaurs ruled for a 100,000,000 years, in the age of reptiles, giving way to the age of mammals about 50,000,000 years ago.

Science News Letter, January 18, 1947

BOTANY

Living Trees of Species Thought Dead Are Found

➤ FINDING living trees of a supposedly extinct species was the exciting experience reported by Dr. Herbert L. Mason of the University of California to the Princeton University Bicentennial Conference on Genetics, Paleontology and Evolution.

He was collecting fossil pine cones on Santa Cruz island off the southern California coast when he found trees bearing exactly the same kind of cones.

After he had published a description of the new-found species he began getting reports of the same pines on the mainland. Examination showed this to be incorrect. What he found was even more interesting. Pollen from the island trees blown across 30 miles of water by the wind had fertilized flowers on a closely related mainland pine and thus given rise to natural hybrids.

Science News Letter, January 18, 1947

Books of the Week

ANNUAL REPORT OF THE SMITHSONIAN INSTITUTION, 1945—*Govt. Printing Office*, 484 p., illus., $1.75. The usual appendix contains authoritative summary article for which this report has long been famous.

BIOLOGIA—Frans Verdoorn, Ed.—*Chronica Botanica*, $4 for 2 yrs. A 4-page monthly newsletter supplement to *Chronica Botanica*, listing international biological societies, commissions and congresses. Jan. 1947. Vol 1, No. 1.

CHEMICAL SPECIALTIES. A Symposium—Compiled by H. Bennett—*Chemical Pub. Co.*, 826 p., illus, $12.50 A guide to those who would like to build up a chemical specialty business. Its purpose is to teach the elements of chemistry to the businessman and give the necessary business information to the chemist.

EVERYBODY'S HANDICRAFT HANDBOOK Hobbies Made Easy For Fun and Profit—*Progress Press*, 155 p., illus., paper, $2. A manual that describes the major arts and crafts at the most elementary level and guides the reader through the more advanced stages.

THE FREEZING PRESERVATION OF FOODS—D. K. Tressler and C. F. Evers—*Avi Publ. Co.*, 932 p, illus. $10. A revised and enlarged edition including all phases of the preservation of food by means of freezing.

FROM HEAD TO FOOT: Our Bodies and How They Work—Alex Novikoff—*Int. Pubs.*, 96 p., illus., $2. A book that discusses each life process, and describes the amazing variety of jobs our bodies do—breathing, digestion, circulation of blood, etc. For readers from the age 12 up. A Young World Book.

HANDBOOK OF MICROSCOPIC CHARACTERISTICS OF TISSUES AND ORGANS, 3rd ed. —Karl A Stiles—*Blakiston*, 214 p., illus, paper, $1.75. An outline which will assist in learning and understanding the microscopic structure and functionings of living tissues and organs.

HOW TO FLY: A Practical Guide to the Fundamentals of Flight—*Progress Press*, 56 p., illus, paper, $1. An explanation of what actually happens in the process of learning to fly, based upon official information of the Civil Aeronautics Administration.

OPERATION CROSSROADS: The Official Pictorial Record—The Office of the Historian Joint Task Force One—*Wise*, 224 p, illus, $2 A record which makes clear the extent of the preparations and activities constituting Joint Task Force One

THE PERSONALITY OF THE PRESCHOOL CHILD. The Child's Search for His Self—Werner Wolff—*Grune & Stratton*, 341 p, illus., $5. A study that deals with such practical questions as education, guidance, and personality diagnosis.

PRACTICAL ELECTRICAL MATHEMATICS—William E. Rasch—*Heath*, 357 p, illus, $2. A book that provides organized instruction in the mathematics of the electrical trade.

THE PROBLEM OF FERTILITY. Proceedings of the Conference on Fertility Held Under the Auspices of the National Committee on Maternal Health—Earl T. Engle, Ed—*Princeton Univ. Press.*, 254 p, illus, $3.75.

SMITH'S COLLEGE CHEMISTRY, 6th ed.—William F. Ehret—*Appleton-Century*, 677 p., illus., $4.75. An up-to-date text for the college chemistry student.

Science News Letter, January 18, 1947

PUBLIC HEALTH

Veterans Improve Health On College Campuses

➤ THE GENERAL health level on American college campuses appears to be improving with the enrollment of veterans in large numbers.

This has been found true at the University of California, where slightly more than half the 22,000 students are veterans. The same improvement in general health has also been noted at the University of Michigan.

Dr. William G. Donald, University physician at Berkeley, said that the student sick rate is far below the prewar level. He cited the following figures on outpatient visits to the student hospital showing the sudden improvement in health: in November, 1944, there were 1,228 visits per thousand; in November, 1945, after the first influx of veterans, the rate went down to 795 per thousand; in November, 1946, after veterans became the predominant group on the campus, the rate was 523 per thousand.

Dr. Donald says the veterans' superior health can be attributed to several factors: they are a physically superior group; they have had more than ordinary contacts with people through travel, building up natural immunities; and their immunity to disease has been increased by frequent vaccinations.

Science News Letter, January 18, 1947

MEDICINE

Streptomycin Ear Damage

➤ DIZZINESS, vertigo and transient or permanent loss of hearing may follow streptomycin treatment, Drs. Edmund P. Fowler and Ewing Seligman of Columbia University College of Physicians and Surgeons warn in the *Journal of the American Medical Association* (Jan. 11).

Because of the possibility of such complications, physicians should consider carefully whether streptomycin is the medicine to give in a particular case and should examine the patient's hearing and balance mechanism within the ear by audiograms and vestibular tests, the New York physicians advise.

If the patient needs the drug, however, the possibility of ear complications should not keep it from being used.

Ear complications occurred in four of about 160 patients treated with streptomycin at Halloran General Hospital, the doctors report. Other cases have been reported by a few other physicians. Commenting on all these, Drs. Fowler and Seligman state:

"It is evident that a high incidence of vestibular disturbance and a sizable number of cases of deafness, either transitory or permanent, will occur with the use of streptomycin of even the best current manufacture if large doses of the drug are given over prolonged periods."

The ear symptoms, if they occur, start as a rule on the 17th to 20th day. The doctors hope it will turn out that they are due to impurities in the drug. To prove this, before and after tests of the patient's ears should be made, they suggest, and records of manufacturers' names and lot numbers of the drug used should be carefully kept.

Science News Letter, January 18, 1947

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BAKING utensil for pies with no upper crust is a flat plate with a removable rim for use in baking the lower crust. This rim, recently patented, can be replaced after the crust is baked by a measuring rim so divided that pieces of desired size can be accurately cut.

Science News Letter, January 18, 1947

INSECT DEFLECTOR, recently patented, to prevent bugs from squashing on automobile windshields, consists of concentric ridges built into the hood of the car that cause upward drafts to carry the insects over the top. The ridges give the hood a terraced effect.

Science News Letter, January 18, 1947

DUST COLLECTOR for the home is an electrostatic air cleaner, refrigerator-sized, that relieves daily dusting by removing the particles from the air. The air is driven through an electrostatic field where the particles are electrically charged, then passes oppositely charged plates which pull aside the dust particles.

Science News Letter, January 18, 1947

STAINLESS-CLAD steel bumpers for automobiles retain their high polish during the life of the car. The stainless-cladding is inseparably united to the mild steel backing, giving a product with excellent mechanical and rust-resistant properties.

Science News Letter, January 18, 1947

HAMMOCK PACK for fruit utilizes two pliofilm-covered sheets of cardboard with circular holes for the fruit. The film across the holes, when heated slightly, stretches to fit the fruit, shown in the picture.

Science News Letter, January 18, 1947

OUTBOARD marine engine, used by the Japs for propelling heavy barges and pontoons for bridges, is an inverted affair; its four cylinders are below the crankshaft. This gives it a lower center of gravity, and makes it less conspicuous.

Science News Letter, January 18, 1947

RESERVATION machine, in use in an airline ticket office, enables the agent to determine if space is available for any particular flight. When he presses buttons representing date and flight number, a master electronic control board in a central office automatically signals the answer.

Science News Letter, January 18, 1947

PLASTIC keys for pianos, beginning to replace ivory from elephants' tusks, cost much less, are of uniform color, and have no joints to reopen because they are made in one piece. They do not crack or discolor under long usage.

Science News Letter, January 18, 1947

MOBILE motion picture equipment, mounted in trucks, is used to entertain American soldiers at isolated posts. It has a new, speedy, dual-arc projector that gives clear 16-millimeter pictures.

Science News Letter, January 18, 1947

If you want more information on the new things described here, send a three-cent stamp to* SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 345. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

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Question Box

ANTHROPOLOGY

What are the five "American types?" p. 87.

CHEMISTRY

To what uses is bark being put? p. 42.

What increases the strength of aluminum alloys? p. 41.

ENTOMOLOGY

What is being done about the stowaway pests from the Pacific islands? p. 39.

ICHTHYOLOGY

How big does the biggest fresh water fish reputedly grow? p. 39.

NUCLEAR PHYSICS

What do authorities say about the possibility of converting hydrogen into helium? p. 85.

NUTRITION

How can synthetic vitamins play their part? p. 36.

ORNITHOLOGY

How can you tell a hopping bird's tracks from a walking bird's? p. 44.

PUBLIC HEALTH

How is world health rated for a postwar period? p. 88.

SEISMOLOGY

What caused man-made earthquakes? p. 40.

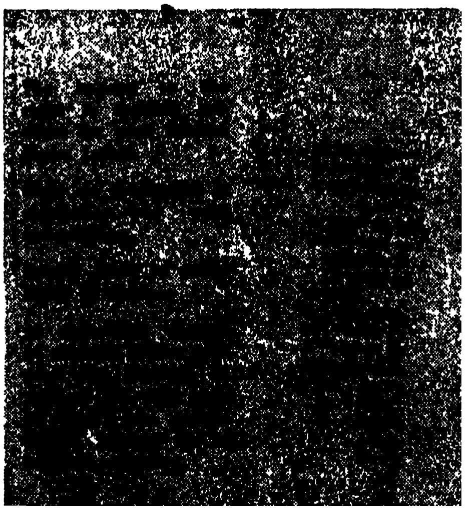
TEXTILES

From what is "Terylene" derived? p. 41.

ZOOLOGY

Why does the puma follow human beings? p. 46.

Where published sources are used they are cited.



SCIENCE NEWS LETTER

Vol. 51, No. 4

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 25, 1947

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A SCIENCE SERVICE [illegible]

MEDICINE

Drugs Arrest Myeloma

Treatment does not cure the bone marrow disease, but temporarily arrests its course and relieves severe pain. Diamidine compounds are used.

➤ THE EXCRUCIATING pain of multiple myeloma is relieved and the course of this malignant bone marrow disease is arrested by treatment with two relatively new drugs and a low protein diet, Dr. I. Snapper of Mount Sinai Hospital, New York, reports in the *Journal of the American Medical Association* (Jan. 18).

The treatment does not cure the disease, Dr. Snapper emphasizes. It is temporarily checked in its development. This occurs even in cases in which the disease has been rapidly getting worse before the treatment is started.

The two drugs Dr. Snapper has used are Stilbamidine and Pentamidine. Drugs of this type, which are diamidine compounds not containing antimony, have been successfully used since 1939 to treat the tropical disease, kala-azar. Before their development, antimony compounds were used for kala-azar and for multiple myeloma, leukemia and Hodgkin's disease. The reason for using the same drugs for these different illnesses was that in all of them there may be an increase in the amount of a protein called globulin in the blood serum.

All 15 patients Dr. Snapper has so far treated with either Stilbamidine or Pentamidine and a diet low in animal protein have shown considerable improvement. The improvement starts soon after the treatment is started, sometimes after the third or fourth injection.

None of the 15 patients treated so far has had any relapse and all have been relieved of pain. Eleven were able to walk when discharged from the hospital. One has since died of diabetic coma, two others have died of myeloma of the kidney and thrombopenia, respectively, and one had paralysis before treatment was started.

The effect Stilbamidine has in arresting the disease may be due to changes it produces in the chemistry of the myeloma, or tumor, cells. Another investigator, Dr. M. J. Kopac of New York, has reported that this drug destroys cancerous cells of transplantable animal tumors without damaging normal cells. The shape of the nuclei of the tumor cells was changed and cell division was stopped. Dr. Kopac believed the drug had a chemical influence on certain specific nucleoproteins of the cell nucleus.

Dr. Snapper found no change of the nucleoprotein of the nuclei of the myeloma cells in his patients, but did find changes in the cytoplasm of these cells, consisting of precipitates of ribonucleic acid.

Science News Letter, January 25, 1947

AERONAUTICS

Flying Wing Progresses

➤ A TWIN-ENGINED, jet-propelled, tailless plane, built in England by Armstrong Whitworth Aircraft, is now ready for tests in the air. It is a forward step in the development of true all-wing aircraft.

The plane, to be known as A. W. 52, is an experimental craft, one step in a long-term program in which the ultimate objective is a flying wing. It is a result of a five-year research, beginning in 1942 with the design and construction of a full-scale section of a wing suitable for laminar flow drag tests in a wind tunnel.

When tested, this wing section was found to have surface vibration of only a few thousandths of an inch, and the structure weight was not more than that of an ordinary wing. Further, it was found that the profile drag of the wing section was only half that of standard wings.

The next step taken was the construction of a tailless glider with a 53-foot span and a weight of three tons. After testing the performance of this in the air for some 200 hours of flying time, the A. W. 52 was constructed. It is an all-metal plane with a span of 90 feet, a weight of 15 tons, and a wing area of 1,314 square feet. It is powered by two Rolls-Royce Nene jet engines.

A second version of the A. W. 52, now under construction, will be powered by Rolls-Royce jet engines of a lighter type. With these there will be no exposed engine nacelles. With the engines completely buried within the body, a further aerodynamic advantage is gained.

Plans for the true all-wing plane are making progress. It will probably weigh about 88 tons. Engineers calculate that this size will be necessary in order that the power units, crew, passengers, freight and fuel may all be contained within the outline of a perfect wing form.

Science News Letter, January 25, 1947

MEDICINE

New Medical Practice Era Predicted for Near Future

➤ A NEW ERA in medical practice coming in the near future was predicted by Dean Willard C. Rappleye of Columbia University's College of Physicians and Surgeons in his annual report to the University's president.

The era will be marked by gradual changes in the fundamental form of medical practice. Dr. Rappleye foresees the general community hospital as the future center of all health services, including dentistry. In addition, he believes specialized, tax-maintained hospitals will be needed for conditions such as tuberculosis, cancer, other chronic, incapacitating illnesses, contagious diseases, mental disorders and the crippled and handicapped. General hospitals for the indigent are "recognized almost universally as the responsibility of the government," he added.

The establishment of sound hospital group practice units where needed throughout the country will, in his opinion, have a particular bearing on the important question of the distribution of physicians. This better distribution of physicians, not producing more physicians, is the answer to the problem of providing proper medical services, he declared.

Such units, he pointed out, will prevent what is perhaps our greatest waste of medical manpower under the present set-up, the period of five to 10 years after completion of hospital training when younger physicians are only partly occupied in the early stages of practice. They could be completely occupied if they practiced in small communities or rural districts, but they will not go into such communities unless modern facilities for practice, such as the hospital group practice unit offers, are available.

Science News Letter, January 25, 1947

MAR 1947

Imperial A... ...ch Institu
New Delhi.

MATHEMATICS

Machines Speed Science

Mechanical "mathematicians" are being designed to solve problems too involved for the human brain. Men must be trained to staff machines.

➤ NEW PLANS for thinking with machines were made by 200 mathematicians and scientists who have been conferring at Harvard University. The "brain" machines that think with numbers will speed scientific investigations, doing some computations that are impractical for the human brain alone to do.

In the new, modernistic building of the computation laboratory of Harvard University, Prof. Howard H. Aiken demonstrated the latest Harvard-built computing machine, the Mark II automatic sequence control calculator.

Automatic digital computing machines think with numbers. Once set up to work a problem, the machine without human intervention can perform the thousands of lightning additions or multiplication to give answers to problems that were hitherto too long or involved for any practical method of solution.

Problems for Machine

How does the air flow around a projectile travelling faster than the velocity of sound? What is the relation between profits, wages and prices, given the hundreds of complicated interrelations between costs and productions? These are but two examples of the problems that are expected to be solvable by the many machines that are now built or being built.

By translating the principles involved in counting on your fingers into complex machines of wires, electron tubes, magnetic wire recorders, photographic films, relays, phosphorescent-coated discs, teletypewriters and printers, and even sound waves in tubes of mercury, the engineers expect to perform such computations.

The biggest problem in these machines is the finding of a good, cheap way of storing the hundreds of thousands of numbers involved in a big problem, and yet having this stored content available on a split second notice. In hand computation, simply writing the numbers on a piece of paper is sufficient. But for a machine which may generate millions of numbers in intermediate steps, and at a rate a thousand times faster than the speediest human calculating machine operator, the method would use up too much paper. Storage of numbers by the hundred thousand on miles of magnetized wire or on microscopic patterns on photographic film was discussed.

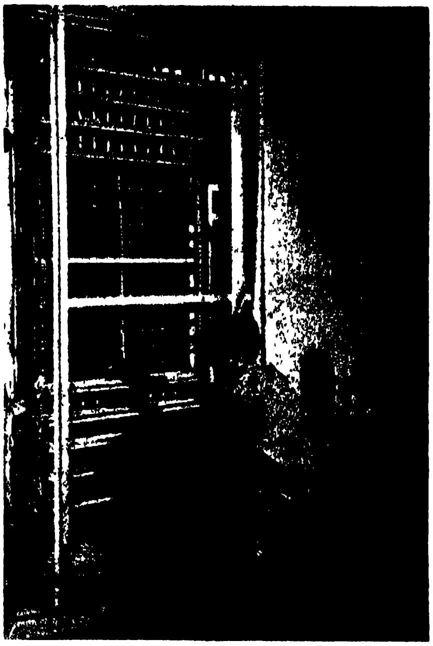
Rapid Memories

When you add or multiply, you temporarily hold one or two digits in your head. But these machines are designed to hold in their "rapid memories" as many as a thousand numbers, each ten or more digits long; and to be able to think of any one of these numbers, to do the next step of a problem in a thousandth of a second.

One suggested solution of these problems included the use of tiny patterns of electric charges on the insulating inner surface of electron beam tubes. Another was the use of a sort of telegraph code—at a million dots per second—which would be put as acoustic pips into a tube of mercury where a thousand pips can be stored before the first one emerges at the far end. When the pips come out, one at a time, they can be put back into the other end of the same tube for the next round of storage. They are always on the go, but they never get anywhere. Numbers have been stored in such a fashion for days, to take the load off the mathematician. This is the purpose of the new digital machines.

But then you cannot have the machine stopping every so often to ask questions of the mathematician. There are ways to make the machine think for itself, to size up the problem and the steps that it has just finished, and from this to make its own decisions on how to go ahead with the thousands of steps ahead of it. These were discussed by Dr. H. H. Goldstine of the Institute of Advanced Study.

With machines that can compress a lifetime of computation into a few days or weeks, the problem of handling the huge output of answers is acute. Harrison Fuller of Harvard University demonstrated the most unusual proposal for the solution of this problem. He showed that with a few dozen vacuum tubes he could actually write Arabic numerals on the face of a cathode ray tube. By pressing any one of 10 buttons, one of each of the ten digits appeared on the face of the tube, written as if by a pencil of electrons. Twenty of these tubes in a row could then display a number 20 digits long. With suitable equipment, these numbers could be recorded photographically on a sheet in a form suitable for immediate photo-printing processes.



MARK II—This picture shows the calculator under construction at Harvard University.

Demonstration of Mark II

The demonstration of the new Mark II calculator was a feature of the four-day meeting. With thousands of relays interconnected with a million feet of wire, it is one of the biggest computing machines in the world. This machine was built for use at the Naval Proving Grounds, Dahlgren, Va., where it will provide answers to the many problems of guided missile flight, bomb trajectories and shell characteristics. The machine is 12 times faster than the Mark I machine which was built at Harvard and presented to the University by the International Business Machines Corporation in 1944.

Prof. Charles C. Bramble of the Post Graduate School, Naval Academy, Annapolis, Md., sounded a call for the immediate training of young mathema-

(Turn to page 52)

AAAS WINNERS—Dr. Quentin M. Geiman and Dr. Ralph McKee (top), department of biochemistry, Harvard Medical School shared in $1,000 prize of the AAAS meeting with Prof. T. M. Sonneborn and Ruth V. Dippell, research associate, both of Indiana University. The winning papers were, respectively, "Cultural Studies on the Nutrition of Malarial Parasites" and "Paramecin 51." (See SNL, Jan. 11, 1947.) Chemical and Engineering News photographs.

From Page 51

ticians in the operation of the many new computing machines now building, lest the construction of the machines outrun the supply of operators trained to use them.

This call was seconded by Prof. Aiken, who stated that a university was for the building of men, not machines, and that the number of young men now trained in the field was far too small. He expressed his intent to initiate courses in the fall in applied mathematics with a strong flavor of computing machines.

The snowballing of interest in automatic digital computing machines is vividly demonstrated by their history. Before the war, only the Bell Laboratories Relay Computer was in existence. In 1944, the IBM-Harvard automatic sequence controlled calculator was put into operation. In 1945, the electronic numerical integrator and computer, called "Eniac," was unveiled at the University of Pennsylvania. Now there are about a dozen projects planned or underway.

The Navy, through the Office of Naval Research, plans to establish institutes for numerical analysis, one on the east and one on the west coast, it was announced by A. T. Waterman, speaking for ONR. These centers, which will use the latest machines, will be placed near large cooperating universities and will encourage outside scientists to become temporary staff members.

Science News Letter, January 25, 1947

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GENERAL SCIENCE-EDUCATION

40 Science Talent Winners

Nine girls, 31 boys are invited to Washington to attend the Science Talent Institute and compete for scholarships totaling $11,000.

➤ NINE GIRLS and 31 boys have been invited to Washington, D. C., Feb. 28 through Mar. 4, to compete for the Westinghouse Science Scholarships in the Sixth Annual Science Talent Search conducted by Science Clubs of America, administered by Science Service. They will spend five days together at the Science Talent Institute in Washington.

The names of the trip winners were announced by the judges as the result of a strenuous competition in which superior seniors of all secondary schools in the United States were invited to participate. The 40 winners were selected from 16,558 entrants. Of these students, 3,197 completed a science aptitude examination, submitted recommendations and scholarship records and wrote an essay on "My Scientific Project".

16 States Represented

The trip winners come from 32 localities in 16 states and the District of Columbia. Entries were received from every state in the union.

Those who come to Washington for the Science Talent Institute, Feb. 28-Mar. 4, on the all-expense trips, will compete for scholarships which will allow them to go to any college, university or technical school of their own selection to continue science or engineering training. One boy and one girl will be awarded $2,400 Westinghouse Grand Science Scholarships ($600 a year for four years), while eight winners will be awarded $400 Westinghouse Science Scholarships ($100 a year for four years), and $3,000 more in Westinghouse Science Scholarships will be awarded at the discretion of the judges.

Selected without regard to geographic consideration, the results show that this year winners come from two states that have not had winners before. Massachusetts and New Hampshire have winners in their public schools this year for the first time. This brings the total of states that have had winners to 34.

Only two schools in the United States have produced more than one winner this year. Stuyvesant H. S., New York, N. Y. will send three boys, and the Bronx H. S. of Science, New York, N. Y. will send two boys to the Science Talent Institute.

Ten schools have been able to repeat winners. The Bronx H. S. of Science, New York, N. Y. leads, having had seven winners in three previous years. Stuyvesant H. S., New York, N. Y.; Bassick H. S., Bridgeport, Conn.; and Eugene H. S., Eugene, Oregon, have each had two winners in previous years. The following schools have had one winner before in the Science Talent Search: Erasmus Hall H. S., Brooklyn, N. Y.; Roosevelt H. S., Washington, D. C.; Cheltenham H. S., Philadelphia, Pa.; Alexander Hamilton H. S., Los Angeles, Calif.; College H. S., Upper Montclair, N. J., and William Howard Taft H. S., New York, N. Y.

All of the winners live at home and attend their local or nearby public, private, or parochial high schools.

Of the 40 Science Talent Search trip winners 72.5% rank first or second in their graduating classes, which range in size from 13 to 750 students. About 17% of the winners have parents who attended college.

Most of the winners are members of science clubs and at least 11 of them are presidents or hold other offices in their clubs. The total number of science clubs in which they work is 70; of these 29 are affiliated with Science Clubs of America.

Many of the winners have chosen their fields of science study. Their choices range from biochemistry to theoretical physics. Eight hope to get into the field of medicine. Fourteen are choosing to enter chemistry for research or engineering. Others want careers in mathematics, mineralogy, physics, electronic engineering, geology, and zoology. All plan to do research in their chosen fields.

Judges of STS

The judges of the Science Talent Search are: Dr. Harlow Shapley, director of the Harvard College Observatory and president of Science Service; Dr. Harold A. Edgerton, professor of psychology, Ohio State University; Dr. Steuart Henderson Britt, psychologist, New York City, and Dr. Rex E. Buxton, psychiatrist, Washington, D. C. Drs. Edgerton and Britt design the Science Aptitude Examination each year for the Science Talent Search.

In addition to the 40 winners of trips to Washington for the final competition for the Westinghouse Science Scholarships, 260 boys and girls will be named for honorable mention in the Sixth Annual Science Talent Search. They will be recommended to colleges and universities for their science aptitude and, if they are as fortunate as those previously named for this honor, they will receive offers of scholarships from many schools and colleges.

Previous winners chosen in the Science Talent Search total 200. Most are now students in colleges and universities where they are preparing themselves for scientific careers. Many have already received one or more college degrees and six are working on their Ph.D degrees. None is more than 23 years of age.

The annual Science Talent Search is conducted by Science Clubs of America, administered by Science Service. Scholarships are provided and the Science Talent Search made financially possible by the Westinghouse Educational Foundation, an organization endowed by the Westinghouse Electric Corporation for the purpose of promoting education and science.

Science News Letter, January 25, 1947

ENGINEERING

Steam Reconditioner Makes Old Surfacings Re-Usable

➤ WITH THOUSANDS of miles of war-worn and neglected highway and street pavements to be replaced, more than usual interest attaches to a steam reconditioner for bituminous binder material, making possible the re-use of old surfacings. This machine, the invention of W. F. Chester of Bayside, N. Y., is protected by patent 2,413,908.

It is of quite simple construction, consisting of a sealed hopper containing a superposed series of perforated steam pipes in grid-like patterns. The broken-up pavement material is thrown into this, and the steam, at fairly high pressure and temperature, digests the bituminous binder out of the mass. At the same time, new pavement materials are added. Preliminary analyses are necessary to determine the needs for each stretch of road. •

Science News Letter, January 25, 1947

A film of *dust* on an electric light bulb may absorb 20% of the light.

GENERAL SCIENCE-EDUCATION

40 Winners to Compete

Nine girls and 31 boys (proportion determined by ratio of boys and girls entering the contest) are being invited to Washington, D. C., for an all-expense trip Feb. 28 to Mar. 4, 1947, to attend the Science Talent Institute. Here one boy and one girl will be awarded $2,400 Westinghouse Grand Science Scholarships Eight winners will be awarded $400 Westinghouse Science Scholarships and $3,000 additional in scholarships will be awarded at the discretion of the judges.

	CALIFORNIA		
Bakersfield	**Self, Cecilia Maud**	**15**	**East Bakersfield High School**
Los Angeles	**Halverson, Phillip Carl**	**17**	**Alexander Hamilton High School**
Pasadena	**Kamb, Walter Barclay**	**14**	**Pasadena Junior College**
	CONNECTICUT		
Bridgeport	**Nagy, Irene Elizabeth**	**17**	**Bassick High School**
Greenwich	**Gregory, Clarence Leslie, Jr.**	**16**	**Brunswick School**
	DISTRICT OF COLUMBIA		
Washington	**Shappirio, David Gordon**	**16**	**Roosevelt High School**
	ILLINOIS		
Chicago	**Addleman, Mary**	**16**	**Aquinas High School**
	Wilt, James William	**16**	**De La Salle High School**
Mt. Sterling	**Briggs, Marilyn Louise**	**17**	**Mt. Sterling Community High School**
Urbana	**Smith, Norman Harkey**	**16**	**University High School**
	MAINE		
Orono	**Cloke, Paul LeRoy**	**17**	**Orono High School**
	MASSACHUSETTS		
Newtonville	**Karplus, Martin**	**16**	**Newton High School**
	MINNESOTA		
St. Paul	**Gordon, Milton Paul**	**16**	**Central High School**
	NEW HAMPSHIRE		
Lebanon	**McKenna, James**	**17**	**Lebanon High School**
	NEW JERSEY		
Cliffside Park	**Cole, Irwin Harold**	**17**	**Cliffside Park High School**
Clifton	**Hayes, John Richard**	**17**	**Clifton High School**
Upper Montclair	**Pike, John Nazarian**	**17**	**College High School**
	NEW YORK		
Albany	**Cooley, Robin**	**17**	**Albany Academy for Girls**
Brooklyn	**Bieber, Herman**	**16**	**Erasmus Hall High School**
	Mattuck, Arthur Paul	**16**	**Midwood High School**
Buffalo	**Inman, Charles Gordon**	**17**	**Bennett High School**
Eden	**Rennagel, William Robert**	**16**	**Eden Central High School**
Huntington	**Demerec, Vera Radoslava**	**16**	**Huntington High School**
New York	**Cooper, Leon N.**	**16**	**Bronx High School of Science**
	Radack, Herbert Brahm	**16**	**Bronx High School of Science**
	Felsenfeld, Gary	**17**	**Stuyvesant High School**
	Taylor, Leonard Stuart	**17**	**Stuyvesant High School**
	Zemach, Ariel	**16**	**Stuyvesant High School**
	Semiat, Paula B.	**17**	**Wm. H. Taft High School**
Perry	**Relyea, Douglas Irving**	**16**	**Perry High School**
	OHIO		
Cincinnati	**McLeish, William Lee**	**17**	**Plainville High School**
Waynesfield	**Emrick, Donald Day**	**17**	**Waynesfield High School**
Willoughby	**House, Herbert Otis**	**17**	**Willoughby Union High School**
	OREGON		
Eugene	**Christensen, Dorothy Jean**	**16**	**Eugene High School**
	PENNSYLVANIA		
Philadelphia	**Eisenberg, Jerome Martin**	**16**	**Central High School**
	Kopple, Kenneth David	**16**	**Cheltenham High School**
	TENNESSEE		
Nashville	**Maynard, Donald More**	**17**	**Peabody Demonstration School**
	WASHINGTON		
Hunters	**Anthony, Katherine Virginia**	**19**	**Hunters High School**
	WEST VIRGINIA		
Sissonville	**Simmons, Gustavus James**	**16**	**Sissonville High School**
	WISCONSIN		
Reedsburg	**Haugh, Eugene Frederick**	**17**	**Reedsburg High School**

AERONAUTICS

New Types of Planes Predicted for 1947

➤ MORE NEW types of aircraft than in any prior year in American air transportation will take to the air in 1947, the Society of Automotive Engineers in Detroit was told by R. C. Loomis of Trans World Airline, Kansas City. Better engines will feature them.

Improved engines, making use of warborn devices, will give them speed and economy. Fuel injection systems will be used for purposes of fuel economy, reduced engine vibration, freedom from icing and improved cooling. The use of the small exhaust-turbo-supercharger on the new Boeing Stratocruiser will increase speeds at 25,000-foot altitude by 50% over sea level speeds, he declared.

No gas turbine engines will be used to power commercial aircraft during 1947, but much development work will be done in applying turbine-propeller powerplant combinations to commercial planes for later use. New aircraft models must be designed to take care of turbojets, he asserted, so that their use must be considered three years away.

Science News Letter, January 25, 1947

MINING

New Clay Analysis Methods Often Detect Minerals

➤ THE CLAYS in the vicinty of hidden mineral deposits are now being used to betray the presence of the ore, thanks to X-ray, the electronic microscope, thermal analysis methods, and the old-time chemical analysis for traces of the mineral.

The technique employed is known as "alteration study." Its extended use in searching for new deposits of minerals to replace depleted reserves was revealed by Prof. Paul F. Kerr, of Columbia University, who is partly responsible for its development and who has used it for the past five years.

Particular attention in alteration study, he states, is paid to the processes of nature that have destroyed original rocks and left in their place clay and various other types of alteration material. A determination of their mineral contents furnishes the clue that leads to the mineral deposits. When the alteration study technique is further developed, he predicts, it will be a valuable weapon in the search for new mineral deposits.

Science News Letter, January 25, 1947

MINERALOGY

New Field Kit Designed For Uranium Prospectors

➤ A NEW FIELD kit for uranium prospectors has been devised by T. R. P. Gibb, Jr., and Howard T. Evans at Massachusetts Institute of Technology.

The instrument will give semi-quantitative determinations of traces of uranium. Instrument including batteries is housed in a plywood case six by seven by 10 inches and weighs just under five pounds. A gasoline blow torch and portable balance are used with it.

The instrument is an adaptation of a method for determining traces of uranium developed by scientists abroad. It involves the spectrophotometric measurement of the brightness of the fluorescence of a sodium fluoride bead containing traces of uranium presumed to be in solid solution. The sodium fluoride bead is used in a stationary instrument devised by the Technology scientists. In the field kit they substituted for the sodium fluoride bead a cast disc of more fusible material and use a simple visual comparator. Details are reported in *Science* (Jan. 17).

Science News Letter, January 25, 1947

ZOOLOGY

Rare Pacarana Now Lives At Philadelphia Zoo

See Front Cover

➤ ONE of the world's rarest mammals, the pacarana, a white-striped rodent about the size of a groundhog, is now proudly being displayed by the Zoological Society of Philadelphia.

Rare even in its native Peru, the pacarana came to the zoo from an animal dealer, who wrote, "You may know what it is." Only three or four pacaranas have ever reached this country alive, and this one is believed to be the only one now in an American zoo.

Tame as a kitten, the pacarana has a broader head than the groundhog, with a sizable tail and white stripes on dark brown ground color. The pacarana makes a cheerful grunting noise and eats sitting erect on its hind legs.

The pacarana was first discovered in Peru by surprised natives in 1873. An early account of the animal described it as a fierce monster, but it has since been found to be peaceful and timid.

Science News Letter, January 25, 1947

POLE OF GENEALOGY—This totem pole of northwest-coast Indians, bought in British Colombia from the last survivor of the "Seaweed" clan of the Tlingit tribe for two cases of whiskey, was brought to the University of New Mexico by Prof. Frank C. Hibben of the department of anthropology. Besides the Seaweed coat of arms, the pole depicts the genealogy of the clan and a Seaweed man.

GENERAL SCIENCE

Science Congress in India

New epoch in history of India is organization of Association of Scientific Workers whose president is Pandit Jawaharlal Nehru.

➤ THE ACCEPTANCE of the presidency of the newly created Association of Scientific Workers of India by Pandit Jawaharlal Nehru, leader of the dominant Congress Party, is taken as marking a new epoch in the modern history of India.

The All-India Science Congress, recently held in Delhi, has also worked under Nehru's chairmanship, and he has amply demonstrated that his conception of the new India is a state that depends heavily on modern science and technology, states Dr. Harlow Shapley, director of Harvard College Observatory.

Specially invited foreign delegates included five Americans, three Canadians, nine British, two French, four Russians and one Chinese scientist.

The lectures by foreign scientists were so feverishly attended that a huge tent with loud-speakers was provided. Five hundred sat on rugs in the aisles when Dr. Shapley spoke on galaxies. A cabinet minister introduced him on that day, and on the following day Pandit Nehru introduced Dr. P. M. S. Blackett of England and Dr. Shapley for reports on the interrelations of science, society, and government in their respective countries.

"Regretfully," stated Dr. Shapley, "I had to report that no government official in America attends science congresses, and that it was apparently left to the governments of India and Russia to lead in the recognition of the role of science and technology in shaping the future."

"The first concern of the scientists in the new Association of Scientific Workers of India," Nehru said in accepting the first presidency, "is in behalf of the people of India, and secondly, for the welfare of the scientists themselves."

Science News Letter, January 25, 1947

MEDICINE

PABA and Salicylates Give Rheumatic Fever Treatment

➤ BETTER treatment for rheumatic fever may result from an innovation suggested by Dr. Hugh R. Butt of the Mayo Clinic. This consists in giving para-aminobenzoic acid, a member of the vitamin B complex familiarly known as PABA, with salicylates, drugs used for rheumatic fever treatment for three-fourths of a century.

Good results with this combined PABA and salicylate treatment in the first patient it was tried on are reported by Dr. Butt and Drs. Thomas J. Dry and Charles H. Scheifley in the Proceedings of the Staff Meetings of the Mayo Clinic.

PABA, they found in this case and in two control experiments on healthy men, increases the amount of the salicylate in the blood and therefore, presumably, gives this drug a better chance to combat the rheumatic fever.

Science News Letter, January 25, 1947

METEOROLOGY

Thunderstorm Study Planned for Ohio Area

➤ FRONTAL TYPE thunderstorms of the Middle West are to be studied by Army planes equipped with radar and other weather instruments, the U. S. Weather Bureau revealed.

It is a joint project, to be based at the Clinton County, Ohio, Army air field, in which the Bureau, the Army and the Navy will cooperate. The National Advisory Committee for Aeronautics and certain universities will also join in the research.

Frontal type storms are common from the Rockies to the Atlantic seaboard during certain months of the year, the Bureau states. They are caused by the passage of cold fronts or cold air masses over areas that have been subjected to warm air masses. These types of thunderstorms are usually more violent than the convectional or radiation types common in Florida, already studied by the same agencies.

The project will cover a 450-square mile area southeast of Wilmington, Ohio, which is adjacent to the Army field. Operations will begin about the first of April and continue until October. The data collected should prove of great importance to aviation, farmers, business and the general public. The project in general will follow the procedures of the similar Florida study of last summer.

In addition to the use of Black Widow Army planes to be used in observations in the air, some 60 land-based stations will be established, encompassing the area. The Army planes, carrying a Weather Bureau observer and Army radar operator, will fly through the storms. Light-powered Navy planes will circle the storms, and also fly through bulging cumulus clouds, to measure storm characteristics.

Science News Letter, January 25, 1947

AERONAUTICS

Portable Lighting System Aids Safe Night Landings

➤ PRIVATE PLANES using small-town airfields will be able to make safe night-landings with the help of a new portable lighting system revealed by Westinghouse at its lighting division plant. The relatively inexpensive system requires only one attendant.

The system includes a beacon, floodlights, landing strip markers and a wind cone. The key of the system is a two-wheel trailer which carries an electric generator and from two to four powerful floodlights, depending upon local needs. The trailer can be pulled by one man or towed by a car.

In use, the trailer with its floodlights is placed at one end of the runway with its beams directed down the landing strip. The beams light up reflecting runway markers which are stuck in the ground at about 100-foot intervals. These markers, shaped like croquet wickets, are made of wire covered with cloth that is impregnated with particles of glass. The shining glass clearly outlines the landing strip to the approaching plane.

When the wind changes in direction, one field attendant can relocate the entire equipment in a short while by merely moving the floodlight trailer and the runway markers.

The beacon used with the system is three and a half feet high, and can be mounted on a hangar or an inexpensive tower. Its 500-watt tubular lamp produces two brilliant 100,000 candlepower beams, visible 10 miles in normal weather, which are directed by lenses on opposite sides as the beacon revolves six times a minute. A duplicate lamp and lens system in the beacon is available as a standby. The eight-foot wind cone is mounted on a hinged pole and lighted by four 100-watt lamps.

Science News Letter, January 25, 1947

IN SCIEN

PHYSICS

Loud-Speaker System Is Used on Train

➤ DETAILS ARE now revealed of a loud-speaker system to be used on a new Baltimore and Ohio train by means of which all passengers will be at all times within reach of the conductor's voice announcing from any one of several locations.

The same device will also bring radio programs, when not in use for other purposes. The train is for regular runs between Baltimore and Cincinnati by way of the nation's capital. Each car is equipped with two loud-speaker units, one power amplifier, and a rotary converter.

Microphones for the use of the conductor, stewardess and dining car steward are located at the buffet lunch counter, the conductor's desk in the club car, the stewardess' compartment in the first coach, and the dining car. Transmission through the train is by four wires running the length of the train and connected through regulation train connectors.

Radio receivers are in the same locations as the microphones. By means of a simple switch, a radio program can be cut at any moment to give way to another announcement.

Science News Letter, January 25, 1947

BACTERIOLOGY

Essence of TB Resistance May Be Isolated

➤ THE MATERIAL in the tuberculosis germ essential for producing resistance to the germ may have been isolated by Dr. Nine Choucroun at Cornell University Medical College.

It is a complex of starchy and fat material that is soluble in chloroform. The material was obtained in a paraffin-oil extract of dead tuberculosis germs, Dr. Choucroun reports in *Science* (Jan. 10).

Animals injected with this material in oil "showed an excellent acquired resistance against infection when they received living bacilli (tb germs) more than three months after they were injected.

Science News Letter, January 25, 1947

E FIELDS

AERONAUTICS

Helicopters to Shuttle Passengers to Airports

➤ HELICOPTERS that have proved their worth in shuttling mail from city post-offices to neighboring airports are now entering a new job. They will be used to shuttle passengers from suburban cities to mainline airports used by long-range transports.

A large-capacity Sikorsky craft will be tested in this service this spring by United Airlines, and additional craft will probably follow the tryout. Other companies are understood to have similar plans. The proposed service is for the benefit of important communities at which landings by commercial transports cannot be made economically.

The helicopter ordered by United Airlines can carry a pilot, three passengers, baggage and 250 pounds of cargo. As an all-cargo plane it can carry 790 pounds.

Science News Letter, January 25, 1947

ENGINEERING

New Floor Construction Gives Stronger Bridges

➤ STRONGER bridges with lighter steel beams in their concrete flooring are possible with a new type of floor construction, the American Society of Civil Engineers was told by C. P. Siess of the University of Illinois. It is called "composite construction."

This new construction utilizes a design which provides rigid connection between the concrete slab that forms the roadway of the bridge and the steel I-beams on which it rests. This is accomplished by welding steel clips to the tops of the beams and embedding them into the concrete as it is poured.

This method enables bridge builders to obtain greater stiffness in their structures, and to save up to 30% in the weight of steel beams used. It often permits the use of a shallower beam. Even with a lighter section, he said, the stiffness of the composite beam will be from two to three times as great as the stiffness of the original non-composite beam.

Science News Letter, January 25, 1947

MEDICINE

Purest Polio Virus Yet Gives Hope of Vaccine

➤ THE PUREST POLIO virus yet obtained has been isolated by Drs. Hubert S. Loring and C. E. Schwerdt of Stanford University.

The virus is 80% pure or better, the scientists state in announcing their achievement.

With a relatively pure virus obtainable there is hope of producing an effective vaccine against infantile paralysis, but it may be a long time before the hope is realized.

One apparent obstacle to speedy production of a vaccine is the small yield of virus. Only about a thousandth part of a gram of virus, or 0.000035 ounce, is obtained from 150 grams (about five ounces) of starting material, which is the brain and spinal cord of cotton rats infected with infantile paralysis.

High speed centrifugation, near-freezing temperatures and chemical treatment are used in isolating the virus. Seen with the electron microscope, it appears as a relatively spherical particle so tiny that its diameter is estimated as 25 billionths of a meter. Chemically, the virus reacts as a protein.

Experiments leading to its isolation in 80% purity were financed by the National Foundation for Infantile Paralysis with dimes contributed by the American people. Technical assistance was given by Patricia Ruth Schwerdt, Dr. Schwerdt's wife; Madeline Brill, Nancy Lawrence, and Dr. Jane Anderson.

Science News Letter, January 25, 1947

CHEMISTRY

"All-Weather" Paper Finds Peacetime Uses

➤ "ALL-WEATHER" paper which preserved wartime maps through water, mud, grime and oil in all theaters of World War II will find many important peacetime uses, scientists at the National Bureau of Standards, who helped develop the paper, predict.

Some of the possible uses for the strong, tough paper are to wrap such varied items as wet fruits and vegetables or radio parts, to make strong bags and sacks, and for outdoor advertising.

Secret of the high wet-strength of the map paper is a colloidal solution of melamine-formaldehyde resin added to the pulp. This resin bonding process helps the paper stand up under conditions which would disintegrate conventional types of paper. Best results were obtained in experiments by using fiber "furnishes" of 100% bleached sulfate pulps. Opacity, the ability to resist light rays, was achieved by adding titanium dioxide.

A light-weight type of map paper was developed late in the war to save space and weight in air shipment. This paper saved an estimated 25% in shipping weight and bulk.

Experiments are now being conducted at the Bureau of Standards to produce papers with even wider uses than the wartime map paper.

Science News Letter, January 25, 1947

INDUSTRY

1946 Rubber Production Greatly Decreased Shortage

➤ THE 66,000,000 passenger car tires produced by American companies during 1946 brought joy to hundreds of thousands of car owners, but there are other users of rubber whose demands were met to the same degree. They range from doctors to coal miners.

Rubber products in the public health field are particularly important for surgical goods, hospital sheeting, rubber drug sundries, and protective rubber footwear and clothing. Rubber in industry is important, ranging in uses from packing material to great conveyor belts, with large quantities employed for electric insulation.

Achievements of the rubber industry in production during 1946 to meet backlogs in orders were revealed by the Rubber Manufacturers Association. For the first time in history, it says, annual rubber consumption topped the 1,000,000-ton mark. Approximately 37% natural rubber and 63% synthetic rubber were used. During the preceding year the industry used 12% natural and 88% synthetic rubber of the GR-S type.

In addition to tires for passenger cars, 13,680,000 casings were made for trucks and buses. This is 92% above the best previous peacetime record. Passenger tire production was approximately one-third greater than in 1940.

By and large, the Association states, rubber manufacturers escaped any major production stoppages during the year, though these were frequently threatened by scarcities of raw materials and components.

Science News Letter, January 25, 1947

ASTRONOMY

Orion Shines at His Best

Most brilliant constellations are seen February evenings, with stars in and around Orion, the warrior, high in the south.

By JAMES STOKLEY

➤ WITH February arriving, the brilliant group of stars in and around the constellation of Orion, the warrior, are in their best position, high in the south. To identify these it is a good idea to start with the three stars in a row that form Orion's belt. Above them is Betelgeuse, which marks one of his shoulders, while below is Rigel, in one of his legs.

Following the direction of the belt stars downward and to the left brings us to Sirius, the dog-star. Part of the figure of Canis Major, the great dog, Sirius is the most brilliant star in the sky, except for the sun. By tracing the line from the belt the other way, upwards and to the right, Aldebaran is located. Characteristically red in color, it is the eye of Taurus, the bull, which is charging on Orion.

Canis Minor

The lesser dog, Canis Minor, is above the big one and contains another bright star, Procyon. Still higher is the constellation of Gemini, the twins, in which Pollux appears. Next to Gemini, toward the east, is Cancer, the crab. Though this group contains no bright stars, it is now made brilliant by the presence of a first magnitude planet, Saturn. Continuing on to the left of Cancer we find Leo, the lion. Part of this aggregation of stars has the shape of a sickle, and at the end of the handle of that implement is the star Regulus.

Still another first magnitude star is shown on the accompanying maps, on which we see the appearance of the heavens at about 10 o'clock on Feb. 1 and an hour earlier in the middle of the month. This first magnitude star is Capella, in Auriga, the charioteer. It is shown at the top of the map for the northern half of the sky, as it is nearly overhead at the times indicated.

After midnight another planet, even more brilliant than Saturn, comes into view. It is Jupiter, which is now in the constellation of Libra, the scales. As it is brighter than any other star or planet then above the horizon, it will not be hard to identify. The moon passes close to Jupiter on the night of February 12. Just before sunrise Venus, which is brighter still, can also be seen, low in the southeast.

The planet Mars is too nearly in the direction of the sun to be seen at all, but Mercury, closest of all to the sun in miles, reaches its farthest east of the sun on February 20. For a few days about then it may be possible to get a glimpse of it in the evening twilight, low in the southwest, just after the sun has gone down.

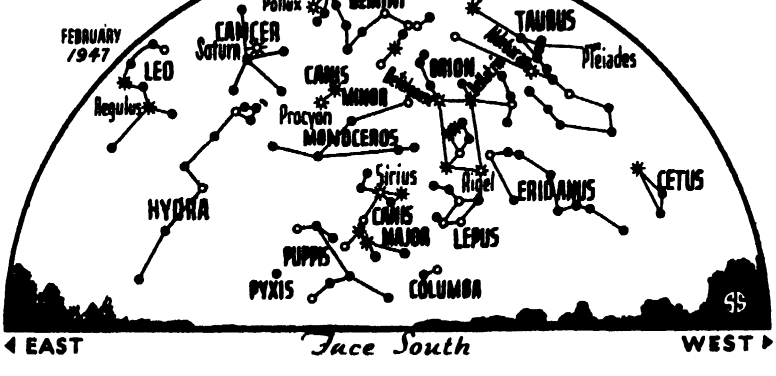
If you watch toward the east after Jupiter appears late at night, you will soon see a bright reddish star, which is Antares, in Scorpio, the scorpion. Now it rises in the early morning hours, but in the summer-time we see it in the evening. If, when Antares has risen, you look for Orion, which was so conspicuous earlier, you will not find it for the warrior has set.

One of the old myths of the stars has an explanation for this. It seems that Orion, a great hunter, once boasted that there was no animal on earth he could not conquer. As punishment for his vanity a scorpion came out of the ground and stung him fatally on the foot. However, his friend Diana, the moon-goddess, interceded with Jupiter to have him placed in the sky. The scorpion was placed there too, but in the opposite direction, so that the two could never be above the horizon together. So now we see Orion on winter evenings, while the scorpion takes his place in the summer-time.

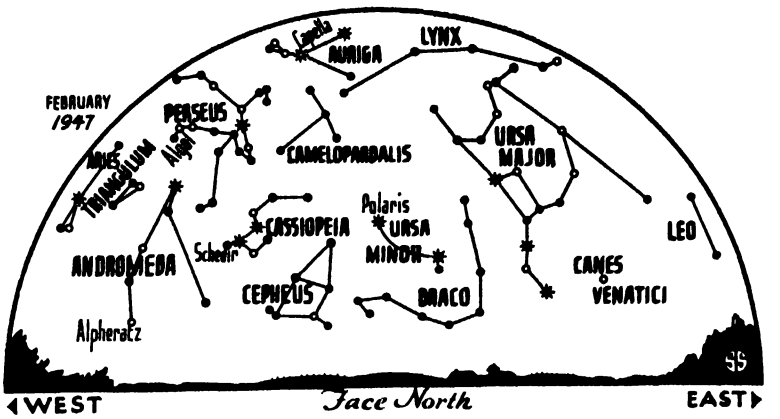
However, it is a curious fact that this will not always be so. There is a slow movement of the heavens called the precession (not procession) of the equinoxes. At present the north pole of the earth points toward the constellation of the lesser bear, Ursa Minor, close to the star we call Polaris, the pole star. But the pole does not remain in this direction. In the course of about 26,000 years it will have described a large circle in the sky, and will have pointed to a number of other stars. About 12,000 years from now Vega, the bright star in Lyra, the lyre, which we see overhead on summer evenings, will be the pole star. Going backwards we would find that several thousand years ago, when the Great Pyramid of Cheops was built in Egypt, a star we call Thuban, in Draco, the dragon, marked the pole.

Determining Season

It is the tilt of the pole toward or away from the sun that determines when we have winter or summer. At this time of year the north pole tilts away from it, the sun is low in the northern hemisphere and we have winter. Six months from now, as it tilts in the direction of the sun, that body climbs higher in our



✡ ✸ ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



sky and we have summer. It so happens that when we have winter, the sun itself is in the direction of the scorpion, and that is why we cannot see it, though we can see Orion, which is in the opposite part of the sky. In June, when the sun is toward the part of the sky in which Orion stands, we cannot see him, but the scorpion is visible all night.

Precession Moves Pole

In about 12,000 years precession will have moved the pole through half of its circle. Then when the sun stands toward Orion, and the scorpion is visible at night, the north pole will tilt away from the sun, so that time of year will be winter. Summer will come, as now, when the north pole tilts sunward, but then Orion will be visible in the southern sky in the evening and the scorpion will be too nearly in the same direction to the sun to be seen.

Also, at that remote date, the winter scorpion will be as high in the evening sky as Orion is now, and that warrior, like Scorpio in 1947, will stand just above the horizon. That will permit people in the United States, or whatever nation occupies this part of the world, to appreciate the beauty of the scorpion. It is really a fine group that does not appear to us in its full glory because it is so low. If, in the summer, you travel toward the equator, you can see it overhead in its full splendor.

Celestial Time Table for February

Feb.	EST	
3	6.00 p.m.	Moon nearest, 224,400 miles
4	3·07 p.m.	Moon passes Saturn
5	10:50 a.m.	Full moon
12	4:58 p.m.	Moon in last quarter
	10·44 p.m.	Moon passes Jupiter
15	4·00 p m.	Moon farthest, distance 251,700 miles
16	5:58 p.m.	Moon passes Venus
17	4·37 a.m.	Algol (variable star in Perseus) at minimum
20	1:26 a.m.	Algol at minimum
	9:00 p.m.	New moon
	10:00 p.m.	Mercury farthest east of sun
22	10:16 p.m.	Algol at minimum
25	7:05 p.m.	Algol at minimum
28	4:12 a.m.	Moon in first quarter

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, January 25, 1947

GEOGRAPHY

Strategic Spitzbergen

➤ THE IMPORTANCE of Spitzbergen in world strategy is emphasized again in the recent reported request of the Soviet Union to Norway for permission to use this northern island in the Arctic ocean for a military base. Hitler recognized its importance when he sent Nazi forces against it in 1943.

Spitzbergen is a group of bleak mountainous islands, possessions of Norway since 1925, that is located nearly half way from Norway itself to the North Pole, and some 300 miles east of Greenland. Military bases on one of them could play an important part in the control of shipping passing north of Norway to Finland and Russian ports, and perhaps offset military bases established by any other nation on Iceland. Spitzbergen also has value as location for a weather station, and it is on the Great Circle route by way of the North Pole from Europe to Alaska.

The Norwegians call the island group Svalbard. Spitzbergen, or Svalbard, is applied usually to the main island of the archipelago. This island has some 25,000 square miles of area. It was once noted for the whale fishing in its vicinity, also for walrus fishing. In recent years its particular value has been its coal mines, from which about 700,000 tons have been taken each year.

Spitzbergen is too far north to produce foodstuffs. Its climate is not as severe as might be expected, however, as its western coast is warmed by the North Atlantic drift. It is less severe than the climate of corresponding Greenland. Vessels may approach the west coast during most of the year.

Amundsen and Byrd used a base on Spitzbergen in 1926 from which they took off to reach the North Pole. Wilkins used it in 1928 for his flight over the pole to Alaska. Scientific expeditions used the island for many exploratory trips in Arctic regions in the two or three decades preceding the war.

Science News Letter, January 25, 1947

ENGINEERING

Mammoth Steam Turbine Generators in Making

➤ MAMMOTH STEAM turbine generators for electric power companies, two in the 125,000-kilowatt class and two in the 100,000-kilowatt class, are under construction by General Electric Company. They are expected to have very high efficiency.

The two larger machines, with cross-compound turbines, will utilize steam at 2,000-pound pressure and 1,050 degrees Fahrenheit temperature. The high-pressure unit will operate at 3,600 revolutions pr minute, and the low-pressure unit at 1,800 revolutions.

In the 100,000-kilowatt generators, one will operate at 1,500-pound pressure and 1,050 degrees temperature; the other at 1,250-pound pressure and 1,000 degrees temperature. Recent advances in seals and gas-purification methods will permit smaller hydrogen-cooled units in all four turbine-generators. Practically all turbine-generators of 15,000 kilowatts and over are now hydrogen-cooled.

Science News Letter, January 25, 1947

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Do You Know?

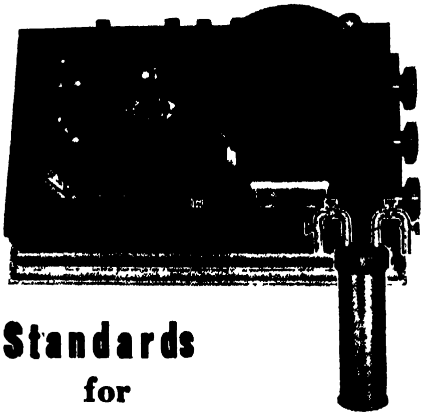
Tin-zinc alloys have been developed for coating steel to prevent rust.

In China only military *vehicles* can be green in color, and only fire equipment painted red; hospital cars and ambulances are white.

When rain wets *coal* in transit in coal cars, a sulfurous acid is sometimes generated that corrodes the metal sides of the cars.

Scrap metal is still wanted; American steel mills require over 2,000,000 tons a month of scrap iron to mix with an equal amount of pig iron to make structural steel.

Hazlenut bushes can be grown as ornamental shrubs in many parts of the United States; they are easy to grow, have little preference to soils, and five-year-old bushes often yield three quarts of shelled nuts.



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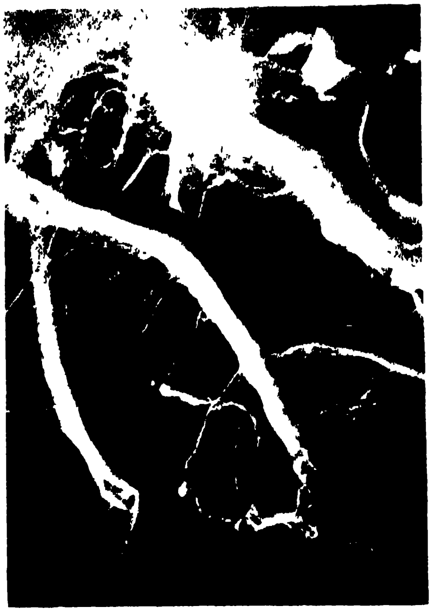

TINY FIBRILS—Ground wood pulp structure revealed under an electron microscope.

PLANT PHYSIOLOGY

Wood Fibers Break Into Tiny Fibrils

➤ WOOD FIBERS, from which paper, explosives and lacquer are made, break into thin fibrils of rod-shaped particles as they are worn away. Fibers such as ramie and rayon, on the other hand, tend to split lengthwise at first, then break up in a haphazard manner when ground in water.

To study just how fibers disintegrate, Dr. P. H. Hermans, director of the Institute for Cellulose Research, Utrecht, Netherlands, ground several varieties in water. He then photographed the worn-down fibers with an electron microscope.

Only in the case of wood pulp are details of a fine structure inside the finest fibrils more or less distinctly visible, Dr. Hermans reports in the *Textile Research Journal* (Nov.).

Science News Letter, January 25, 1947

GENERAL SCIENCE

Mechanizing Exploration

➤ MECHANIZED exploration of the Antarctic may become possible as result of tests to be conducted by the Navy's expedition under the technical direction of Rear Adm. Richard E. Byrd, the Navy said.

Equipment for compacting snow for the use of vehicles and methods for preparing vehicles for use in the snow are scheduled for tests. The equipment was designed by engineers of the Navy's Bureau of Yards and Docks. Other experiments to aid overland travel in Antarctica will include determination of the differences in the properties of snow and ice at the extremely low temperatures of the polar regions compared with their properties in the temperate zones.

With the results of the experiments, engineers hope to design vehicles to replace the traditional dogsleds used in polar exploration. The present Byrd Expedition's attack on the problem of land travel on the wastes of the Antarctic will include devices for compacting the snow for vehicles to operate on top of the cold, white surface.

Drier and more powdery than the snow that falls in the United States, the polar snow becomes a blinding swirl dangerous to a traveler from the slightest gust of wind.

Some of the scientific problems to be tackled with special instruments on the current expedition are load tests, penetrometer readings, compression, bending, punching and shear tests of the ice or snow.

Two variations of a German model slat snow roller, a standard sheepsfoot roller, groups of pontoons and snow drags will all be tested for use in compressing the snow for travel.

For possible use on airstrips, a snow surface heater has been designed to convert the snow into ice. A tractor pulls a compressor and heater on toboggan runners with a fuel oil tank mounted on top. By melting the snow so it can form ice, this equipment is expected to provide a fast method of preparing the surface of an airstrip with solid ice.

Lengths of wood, operating on the same principle as snow shoes, will be tried for surface transportation. They will be used on tractors to distribute the weight on the snow surface.

Jeeps and other vehicles to be used in Antarctic travel will profit from wartime designs for enclosures. Use of plexiglass, windshield wipers and asbestos insulation will protect polar travelers.

Science News Letter, January 25, 1947

GENERAL SCIENCE

Guided Missile Research

Dr. Karl T. Compton leads the Joint Research and Development Board committee studying research and development programs on guided missiles.

➤ PLANNING for the nation's research and development programs on guided missiles is being done by a Joint Research and Development Board committee under the temporary chairmanship of Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, the board disclosed.

The committee, which includes both civilian and military scientific leaders, is charged with the "continuing study, evaluation, improvement, and allocation of research and development programs on guided missiles in relation to the overall aims of the national defense effort and to the available and potential store of scientific information, personnel and facilities, leading to the formulation of an integrated program in this field," it was stated.

Each of the four Army and Navy groups which have been most concerned with the guided missiles program is represented on the committee by high-ranking officers. They are Vice Adm. A. W. Radford, deputy chief of Naval Operations for Air; Vice Adm. G. F. Hussey, Jr., chief of the Navy's Bureau of Ordnance; Brig. Gen. A. R. Crawford, of the Army Air Forces; and Brig. Gen. H. B. Sayler of Army Ordnance. In addition to Dr. Compton, civilian members of the guided missiles group are Dr. H. L. Dryden of the National Bureau of Standards and Dr. E. R. Gilliland of the Massachusetts Institute of Technology. Four officers have been designated deputies to the Armed Forces representatives, while six associate members and two alternates were also named from the Army and Navy.

The Joint Research and Development Board, of which Dr. Vannevar Bush is chairman, was created last August as an inter-service coordinating group for scientific research and development and is an agency of the Secretaries of War and Navy. Prior to its establishment, the Joint Chiefs of Staff appointed a Committee on New Weapons and Equipment, with responsibility for the coordinating work. Under the chairmanship of Dr. Bradley Dewey, this group made recommendations on guided missiles which have been turned over to the new group.

It was revealed that the committee on guided missiles held its first meeting Dec. 19.

Science News Letter, January 25, 1947

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ENGINEERING

Oil Field Brines May Yield Magnesium

➤ OIL FIELD brines may be expected as a source of magnesium, the American Society of Civil Engineers was told by Ogden S. Jones of the Kansas State Board of Health.

These brines come in drilling for oil wells when deep-seated salt waters are tapped. They may have concentrations of chlorides and solids of from six to seven times that of sea water. The accepted practice where such brines are now raised to the surface is to put them deep under ground in special wells so that they will not pollute fresh water streams.

It would require 400 barrels of chlorine-free water to dilute one barrel of this brine so that it would comply with the standards of the U. S. Public Health Service, Mr. Jones said.

After describing various methods utilized for the disposal of brine, mostly without any attempt to salvage the salts contained, Mr. Jones warned that the water supply of the nation is not limitless. We are using more water than formerly and putting less back into the ground. This condition cannot keep up indefinitely, he said, urging a program of water conservation and public action to prevent stream contamination.

The need of a federal law to coordinate the activities of the state stream pollution control units was stressed by Don E. Bloodgood of Purdue University. Nearly 100 bills have been introduced into the Congress in the past 50 years, he said, but none has passed due to the failure of conservationists and public health officials to agree.

Science News Letter, January 25, 1947

PHYSICS

Electronic "Stopwatch" Times Atomic Particles

➤ THE SPEED of atomic particles can now be measured to one thousandth of a millionth of a second. A new electronic "stopwatch" developed in Yale University laboratories measures intervals as brief as that.

In addition to measuring the speed of atomic particles, it counts them also, and determines the energy of the charged particles in nuclear reactions. It is a combination of conventional radio vacuum tubes and other standard electrical equipment.

Its operation depends upon the synchronization of electrical counters which detect an electrical pulse in the circuit. The timing is accomplished by measuring the amount of delay inserted in the circuit in order to synchronize the counters.

Science News Letter, January 25, 1947

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ORNITHOLOGY

NATURE RAMBLINGS

by Frank Thone

Winter Guests

➤ WINTER BIRDS do not have too hard a time of it in ordinary winter weather. Chickadees and nuthatches and their cheerful little kindred are used to cold weather—even seem to like it, for they do not fly on farther south as they easily might. They make a pretty good living by prying insect pupae and egg masses out of crevices in the bark of trees, harvesting the seeds of weeds that stick up through the snow, and exploiting other sources of food that human beings would never think of.

Heavy snowfalls, especially if they are followed by light rain or partial thaw that puts a hard crust of glaze-ice on top, are apt to make life difficult on even the hardiest of "snowbirds." All but the tallest weed stalks become inaccessible, and the scattered food on the ground, which the birds can see even if we cannot, is sealed down tight.

At such times putting out food for the birds becomes a real act of mercy. Nor should you forget to put out a dish of water a couple of times a day, warming it up to the temperature of your own coffee so that it will last longer before it freezes over.

Feeding may be as simple as you like —even table crumbs scattered on the snow will help a lot of birds. However, if the snow is loose this is rather wasteful, for much of the food will sink out of sight and be lost. It is better to rig up some kind of feeding tray, preferably with a board for windbreak on the weather side. Also, it is possible to put your tray on top of a post, or in some other position out of the reach of cats.

Whatever else you may feed your birds, don't forget to provide lumps of suet. Birds in winter need lots of calories to keep their small selves warm, and suet is one of the most concentrated sources of bodily energy that can be offered. Even with the price of meat as high as it is, you can afford a bit of suet for the birds occasionally.

It is best not to leave the suet lumps loose on the feeding tray, lest jays or other large birds fly off with them bodily, leaving nothing for later comers. Nail your suet to a tree, or string it on a thick wire or stout cord big enough to give small birds foothold.

One ingenious woman used an old wire soap-holder to make a one-mouthful-at-a-time suet-holder. She fastened one side down loosely with staples, so that it would turn as on hinges. For the other side she arranged a rough latch of wire. This made the provisioning of suet a task she could take care of in a few seconds, and she always had birds to watch through her kitchen window.

Science News Letter, January 25, 1947

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SOCIOLOGY

Marriage Rate Increases

➤ ABOUT a million and a half more men and women made a trip to the altar last year than in 1945.

During the first ten months of 1946 almost 50% more couples were married in the large cities of the United States than during the same months of the preceding year.

The number of marriages rose in all parts of the country. Large cities in New England showed a 53% increase from 1945 to 1946. The corresponding gain for the Middle Atlantic states was 59%. The marriage rate for large cities in the East North Central states was up 66%.

The smallest increase in marriages in 1946 as compared with the preceding year, the last war year, occurred in the Far West, where the marriage rate was maintained at a high level throughout the war period, statisticians of the Metropolitan Life Insurance Company report.

Marriages in the cities of the Mountain and Pacific states last year were only 13% higher than during the preceding year. The South Atlantic states recorded next to the smallest increase, but even so they showed a 22% rise for the year.

During the first six months of 1946, a total of 1,165,175 marriage licenses was issued, as compared with 718,316 from January through June of 1945, records of the National Office of Vital Statistics, U. S. Public Health Service, show. In all of 1945 only 1,632,156 licenses were applied for.

During the first 11 months of 1946, over 716,000 couples applied for marriage licenses in cities of 100,000 or over, comprising about one-third of the total population of the United States.

The previous peak marriage year was 1942, our first year at war. The gains in the large cities in 1942, however, were concentrated in the South and the West, while the number of marriages in urban centers of the Northeast actually decreased.

Science News Letter, January 25, 1947

VETERINARY SCIENCE

Birds Can Be Infested With Barnyard Disease

➤ LARYNGOTRACHEITIS, a disease which wreaks havoc in American barnyards, is easily transmitted to birds, Dr. K. B. DeOme, University of California veterinary scientist, reported at the meeting of the Pasteur Society of Central California.

Three minutes' exposure to air containing droplets of the virus of this disease consistently produced clinical cases in birds, he found.

Fifteen minutes' exposure to virus-bearing dust on chick down caused infection, with no help in preventing it from glycol vapors or ultraviolet radiation. Air-borne cross-infection of birds was produced in three hours' exposure in spite of glycols and ultraviolet.

Science News Letter, January 25, 1947

Ether has been used as an anesthetic for a century.

Books of the Week

ARCHAEOLOGY OF ALKALI RIDGE, SOUTHEASTERN UTAH: With a Review of the Prehistory of the Mesa Verde Division of the San Juan and Some Observations on Archaeological Systematics — John O. Brew — *Peabody Museum,* 346 p., illus., $4.25, paper, $10, cloth. Vol. XXI.

THE BIRDS OF NORTH AND MIDDLE AMERICA: A Descriptive Catalog—Robert Ridgway and Herbert Friedmann — *Govt. Printing Office,* 484 p., illus., paper, $1.25. Smithsonian Institution, U. S. Natl. Museum Bul. 50.

CHEMISTRY FOR THE EXECUTIVE: A Layman's Guide to Chemistry — Ralph K. Strong—*Reinbold,* 445 p., illus, $6. An informal presentation of the study of chemistry by means of a series of interviews between the executive and the author.

COMMERCIAL BROADCASTING PIONEER: The WEAF Experiment 1922-1926—William P. Banning — *Harvard Univ. Press,* 308 p., illus., $3.50. The story of the pioneering effort which proved how nation-wide broadcasting as a public service could be financially supported.

FUNDAMENTALS OF SEMI-MICRO QUALITIVE ANALYSIS—Carl J. Engelder—*Wiley,* 385 p., $3.50. A textbook that places emphasis throughout on integration of theory, laboratory work and problems.

HOW TO TAKE PHYSICAL INVENTORY — Richard F. Neuschel and Harry T. Johnson—*McGraw-Hill,* 159 p., $2. A practical guide presenting the principles and techniques for planning and taking a physical inventory.

THE NEW FIBERS—Joseph V. Sherman and Signe L. Sherman—*Van Nostrand,* 537 p., illus. $5. Information about new fibers, together with supplementary data on applications.

PHYSICS TELL WHY: Atomic Energy Edition — Overton Luhr—*Cattell,* 387 p., illus., $3.75. An explanation of some common physical phenomena such as radar, atomic energy, jet-propelled planes, etc.

SPEEDLIGHTS: Construction and Use—Arthur Palme — *American Photographic Publ. Co.,* 128 p., illus., $2.50. All the necessary information for those who wish to home-assemble a useful speedlight with all of its individual parts readily available.

TAKE A NUMBER: Mathematics for the Two Billion—Lillian and Hugh Lieber—*Cattell,* 221 p., illus., $2.75. Written in an engaging style with drawings to describe the fundamentals and practical use of mathematics.

TEXTBOOK FOR PSYCHIATRIC ATTENDANTS —Laura Fitzsimmons—*Macmillan,* 332 p,. $3.50. A textbook for use in training attendants in mental hospitals.

VITAMINS AND HORMONES: Advances in Research and Applications, Vol IV—Edited by Robert Harris and Kenneth Thimann—*Academic Press,* 406 p., illus., $6.80. The latest volume in this series indicates in three of the review articles the present trend toward increasing interrelationship between vitamin and hormone research.

Science News Letter, January 25, 1947

DENTISTRY

Caries Agents in Water

➤ DRINKING WATER may contain substances that make teeth more vulnerable to decay.

Evidence for this was discovered by Dr. Henry Klein, U. S. Public Health Service dental researcher, in examinations of the teeth of more than 3,000 New Jersey school children. These were made with the cooperation of Dr. J. M. Wisan, New Jersey health department's dental chief, and Dr. John F. Cody of the U. S. Public Health Service.

The children lived in five communities of southern New Jersey. In three of these communities the water supplies contained enough fluorine to favor resistance to tooth decay. In the other two, the water was considered fluorine-free.

Of the 3,000 children, 1,307 had been born outside the five communities and moved into them at various ages. Of those moving into the fluorine communities, the younger the child was at the time he arrived there and the longer he lived there, the less his teeth were attacked by decay. This showed the now generally recognized effect of fluorine in drinking water in favoring resistance to tooth decay.

By contrast, among the children moving into the fluorine-free areas, the most recent arrivals had the best teeth while those who had lived in the area the longest had the worst teeth so far as decay was concerned.

Scientists are now actively searching for the substances in the water of the communities that make teeth more vulnerable to decay. Superficial examination shows that the nonfluoride waters in the communities are acid enough to need treatment with alkali and that they contain so much excess iron that it is necessary to aerate the water to remove it. An unusually high content of nitrates has also been found in these waters.

Details of the study are reported by Dr. Klein, who is now at the Kellogg Institute, Ann Arbor, Mich., in *Science,* (Jan. 17).

Science News Letter, January 25, 1947

INDUSTRY

New Mechanical Invention Shoots Grains From Guns

➤ THE "GRAINS shot from guns" familiar through breakfast-food ads have been put on an automatic, continuous-production basis by a machine on which U. S. patent 2,414,185 has been issued to Edward D. Andrews of Akron, Ohio.

A battery of eight of the steam guns are arranged, breech to breech, around a hollow rotating shaft which is also the steam duct. As they turn like the spokes of a slow wheel, each muzzle receives a charge of the food to be processed, through an automatic hopper. Then a closing device is clamped on and the steam pressure built up. As the muzzle comes around almost to the starting-point, the action of a cam suddenly releases the muzzle-stopper and the gun discharges its now well-steamed contents into a funnel-bottomed receiving chamber, from which it flows to the packing room.

Rights in the patent have been assigned to the Quaker Oats Company.

Science News Letter, January 25, 1947

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• New Machines and Gadgets •

BABY BOTTLE warmer, with a plastic base to hold the bottle upright, uses household electric current with a heating element that does not break, burn or short circuit. The outside of the heater can be touched without danger of burns.

Science News Letter, January 25, 1947

ELECTRIC light bulb, flaring to twice or more the width of the ordinary globe shaped bulb, provides both direct and indirect lighting The top flat end diffuses light upward through a special frosting, while other light diffuses downward through an opalescent coating on the sides

Science News Letter January 25, 1947

COLD STORAGE box for airplane shipments is a four foot cube insulated with fiber glass and cooled with dry ice When containing six slabs of the solidified carbon dioxide, 10 inches square and one inch thick, the inside temperature is lowered 80 degrees Fahrenheit and held so for eight hours.

Science News Letter January 25 1947

ELECTRONIC metronome, to keep time for musicians, employs a thyraton vacuum tube that gives impulses at timed intervals. A flash baton enables a practicer to follow a beat visually while the audible beat can be modulated from slight to high loudness.

Science News Letter, January 25, 1947

WINGED AUTOMOBILES are used to test tires at high speeds The wing is attached to one side of the car, as shown in the picture, and offsets the centrifugal force of the vehicle racing around a circular track With it, the wear is about the same as on a straight highway.

Science News Letter, January 25, 1947

CONTINUOUS steam still provides an economical method for producing turpentine and rosin from Southern pine sap Pre heated gum, or sap, is fed continuously into one end, and the two products come out the other at separate points The new method is faster and cheaper than the batch method.

Science News Letter, January 25, 1947

CENTRIFUGAL CLUTCH, an automobile type, is used to improve oil burning heating plants. It links the electric motor and air fan on one end of the drive shaft with the oil pump on the other and delays pump action until the fan is delivering sufficient air for complete combustion

Science News Letter, January 25, 1947

WORKSHOP UNIT, consisting of five separate machine tools, has a single electric motor that can be transferred quickly from one machine to the other Suitable for a home shop, the unit has a lathe, grinder, drill press, router and shaper. The motor operates on either direct or alternating current

Science News Letter, January 25, 1947

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St, N W, Washington 6, D C, and ask for Gadget Bulletin 346 To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

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Question Box

AERONAUTICS
What is the latest development in all-wing aircraft? p 50

ASTRONOMY
What determines whether we have winter or summer? p 58

DENTISTRY
Can drinking water harm teeth? p 63

ENGINEERING
What is composite construction? p. 57

GEOGRAPHY
Why is Spitsbergen Island strategic? p 59.

INDUSTRY
What did 1946 mean to the rubber situation? p 57

MATHEMATICS
How may calculating machines be constructed to "remember?" p 51

MEDICINE
How does PABA given with salicylates help combat rheumatic fever? p 56

MINING
What new methods of analysis aid detection of mineral deposits? p 54

ORNITHOLOGY
What aspect of winter is hard on birds? p 62

ZOOLOGY
How ferocious is the pacarana? p 55

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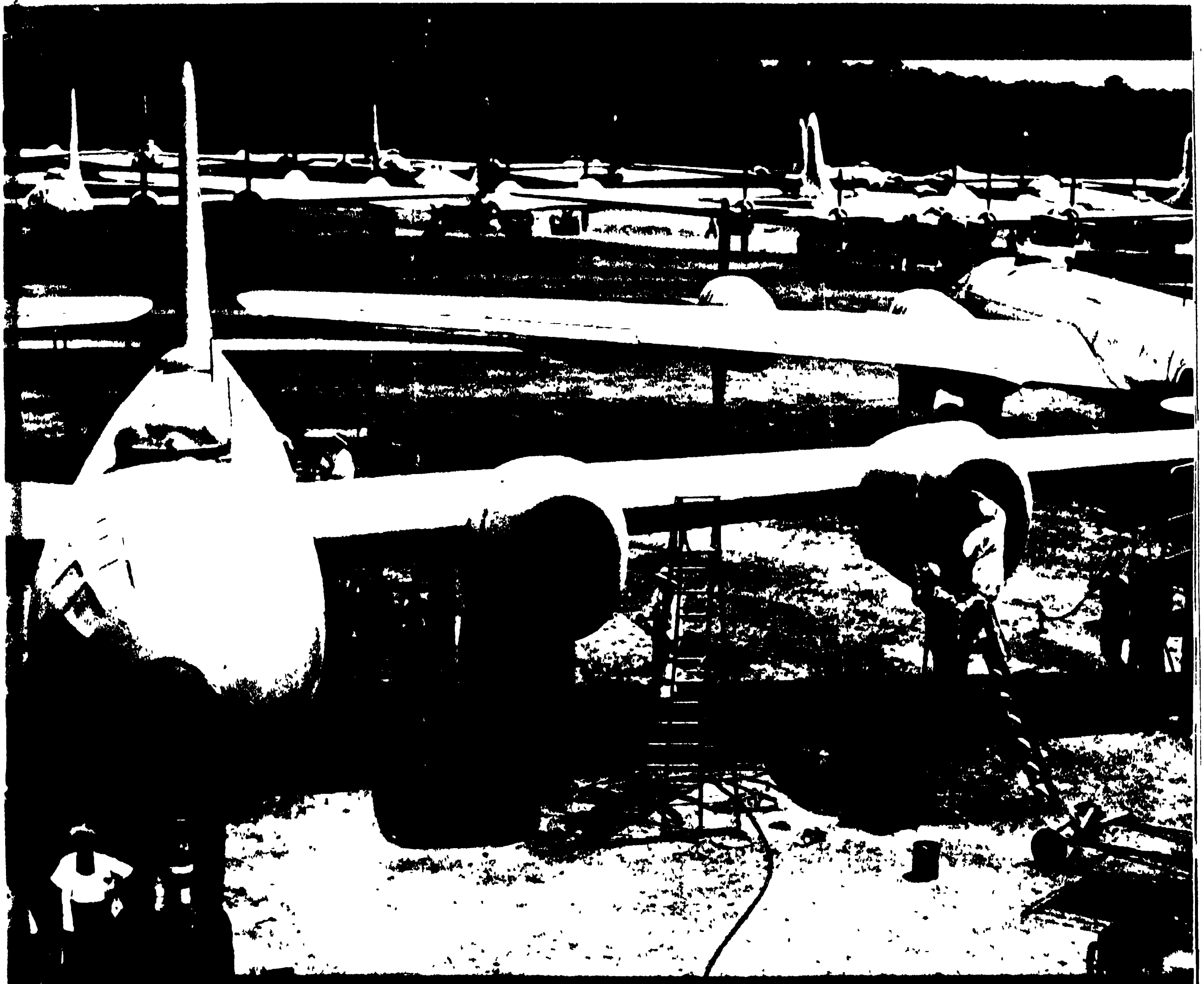
SCIENCE NEWS LETTER



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NUCLEAR PHYSICS

Cheap Atomic Power in '60

Engineering problems confront scientists before the atom can be put to power use, say experts in discussing atomic power prospects.

➤ LOW-COST atomic power will not be available before 1960, two War Department atomic experts say.

Dr. Henry T. Wensel, chief of the scientific branch of the research group of the War Department General Staff, and Dr. Ralph E. Lapp, scientific adviser of the scientific branch, described atomic power prospects as guests of Watson Davis, director of Science Service, on Adventures in Science heard over the Columbia Network.

Engineering problems must be solved before the power of the atomic bomb can be turned to power use, the scientists stated. The two big problems are getting structural materials which will withstand the high temperatures of the atomic pile and developing methods of getting the heat out of the system.

Dr. Lapp said that an atomic power pile will not explode like an atomic bomb; but unless the heat is conducted away fast enough, the pile would melt.

"The first practical power piles," Dr. Wensel predicted, "will not compete with coal or oil and they will undoubtedly be used for special applications where the cost of the power does not prohibit use."

Atomic power for naval vessels and for use in out-of-the-way places where other fuels are not available, such as perhaps the Antarctic, were suggested by the atomic scientists as early applications.

Dr. Wensel described the atomic power plant being built at Oak Ridge, Tenn., as the first model of a nuclear machine to produce useful amounts of power, but added, "We are a long way from realizing a practical nuclear pile that will compete with coal or oil as a source of power."

When atomic power is perfected, the scientists said, a plant big enough to supply a city of 100,000 persons could be housed in a relatively small two-story building. Atomic power piles of the future will use enriched uranium 235 and be much smaller than the massive Hanford, Wash., plant which runs on natural uranium.

Atomic power for aircraft was forecast by Dr. Lapp. Most serious problem, he said, will be shielding against harmful radioactivity.

"I would estimate it would take about 50 or 75 tons of shielding material for a 10,000 horsepower atomic engine," he declared.

Before atomic power plants can produce low-cost power, the scientists said that radioactive isotopes from atomic energy piles will be put to many important uses by scientists.

With radioactive materials, they predicted new knowledge of medicine and biology, mass air movements and weather, food chemistry and packaging techniques, vacuum tubes, food chemistry, ocean currents and other fields.

Science News Letter, February 1, 1947

AERONAUTICS

Plastic Cocoons Bombers

See Front Cover

➤ A NEW "cocooning" process to keep idle bombers fit for quick return to service has been revealed by the Army.

The method is even suitable for preserving B-29 Superfortresses, of which the Army now has approximately 1,500 that otherwise would be destined to become spare parts. They are now being preserved by spraying on them an airtight coating so that they will be ready for future use with little reconditioning. The covering will keep out moisture for about 10 years, it is expected.

These planes are too large to be stored in buildings and therefore must remain in the open where they are subjected to all sorts of weather. In this new process they are stripped of movable equipment, including their engines, thoroughly cleaned, then given five coats of the special plastic spray.

The B-29 pictured in the Army Air Forces photograph on the cover of this SCIENCE NEWS LETTER is a trial horse for a new method of storage with engines removed; others will be stored with engines in place.

Open spaces and ports are bridged over with synthetic cobwebs, which are then sprayed with a solid coat of plastics. Each coat sprayed on the plane is a different color to enable workers to know when the ship is entirely covered, so as to prevent any leaks. The fourth coating has an asphalt base which excludes all moisture. The final coating is an aluminum color, chosen because it reflects the rays of the sun and keeps the interior at a more even temperature.

De-cocooning a plane is an easy and rapid process. It can be carried out while engines are being removed from storage, reconditioned and installed, and while other equipment is being returned to the bomber. In an emergency, the planes can be put in the air in relatively short order.

Science News Letter, February 1, 1947

MEDICINE

Meeting to Study Thyroid Gland Action

➤ THE FUNDAMENTAL physiology of the thyroid gland, most familiar to the layman when it is disordered and goiter results, was explored in a conference at the New York Academy of Sciences.

Dr. J. H. Means of Harvard Medical School was chairman of the conference.

Doctors specializing in care of patients with goiter and other gland disorders are joining with anatomists, biochemists, biologists, physiologists, cytologists, pharmacologists and a veterinarian to pool knowledge and set the stage for future research.

Material advances in this field have been made in recent years because of the availability of new methods of study such as those of enzyme chemistry, cytochemistry, tissue culture techniques, microdissection, hormone assays, radioactive iodine and the use of antithyroid drugs.

"Future research in the field," Dr. Means said, "will include such problems as the mechanism of action of the thyroid and pituitary thyrotropic hormones, and particularly how they act on their cellular end-organs."

The thyrotropic hormone is produced by the pituitary gland in the head and has an influence on the thyroid gland.

Science News Letter, February 1, 1947

2 1 MAR 1947
Imperial Agricultural Research Institute, New Delhi.

PHYSICS

Resnatron May Aid Radio

Radar-jamming war veteran, this high-frequency generator tube produces 140 kilowatts at 450 megacycles. It may bring FM radio and television into your home.

➤ ADD THE WORD "resnatron" to your electronics vocabulary. In the future this high-frequency generator tube may bring to your home frequency-modulated radio and television, and it may be a boon to long distance high frequency communications.

Unlike the magnetron, which in radar transmits ultra-high frequency power in short bursts, the resnatron pours out continuous wave power.

Developed at the University of California beginning in 1938, the resnatron was used for the jamming of German radar during the heavy raids of the spring of 1945.

The development of the resnatron is a drama-packed story of a brilliant young scientist whose career was interrupted for several years by a back injury and who returned to his work still lying flat on his back.

Dr. David H. Sloan

He is Dr. David H. Sloan, associate professor of electrical engineering. Dr. Sloan assisted Prof. Ernest O. Lawrence in the construction of the first successful linear accelerator in 1930, a machine which produced three and a half million electron volt mercury ions.

In 1932, Dr. Sloan designed the world's first million-volt X-ray tube, which, built at the University of California Medical School, still brings relief to victims of cancer. He helped Prof. Lawrence build the first major cyclotron, which was completed in 1934.

Then a back injury forced him to retire from the laboratory, and kept him in bed for years.

In 1938 Dr. Sloan, still unable to move about, discussed with Prof. L. C. Marshall, of the Berkeley engineering staff, the possibility of building a high frequency tube which they could use in a high-powered electron linear accelerator.

At that time the pulsing techniques of radar were not known and there was no method for obtaining ultra-high frequency continuous wave power needed for such an atom-smasher. The original linear accelerator had been abandoned because of this and because the cyclotron offered a better way of obtaining high energy particles with known methods of acceleration.

With Dr. Sloan still on his back in the early stages of the work, the two scientists worked for two years without result. Then in 1940 they built a tube that worked. In December, 1940, they put into operation a resnatron which set a world's record for that time of high-frequency output; the tube produced 70 kilowatts at about 860 megacycles.

OSRD Project

The project was one of the first taken under the wing of the Office of Scientific Research and Development after its formation in 1940. In 1942 it was transferred to the Westinghouse laboratories at East Pittsburgh, Pa., for manufacture and development as a radar countermeasure device. Dr. W. W. Salisbury, working with Dr. Sloan and with the advice of Dr. Marshall, supervised this development and later directed its operation in England.

Two resnatrons, sending high-frequency power through a horn fashioned of chicken wire, successfully jammed German radar as far out as 300 miles, as high as 30,000 feet, and for a breadth of about 15 miles at the widest point. The jamming was good for frequencies between 350 and 600 megacycles, which the Allies were most anxious to deny to German radar.

Through this blanked-out sliver of the atmosphere Allied bombers traveled to some of their most devastating raids over Germany.

The resnatron incorporated one of the essential features which made possible Dr. Sloan's million-volt X-ray tube. This was the "explosive burst" firing of electrons from the cathode.

Electrons emitted from filaments in the tube are fired in bursts from the cathode through a focusing grid arrangement across a gap to the anode resonator where they transfer their energy into the radio circuit which conveys power to the radio antenna.

RADAR JAMMER—The world's heaviest and most powerful microwave tube, the resnatron, is being modified at Westinghouse Laboratories to improve television and ultrahigh frequency transmission.

A second major innovation of the tube was the correlation of the time required to cross the gap and the shift in phase of the voltage to permit the voltage in the anode resonant cavity to go through its minimum value just when the electrons arrive, thereby wasting the least power.

Resonant Cavity

The resnatron was also one of the first tubes in which the traditional coil was abandoned in favor of a resonant cavity.

Drs. Sloan and Marshall say there is no more powerful and efficient source of stable power amplification than the resnatron. It is the only instrument of its sort which has achieved in ultra-high-frequency operation the same efficiency of a high-frequency radio broadcasting station—about 80%. Such steady performance is necessary for broadcast operations, and makes the resnatron particularly applicable to television and frequency-modulated radio.

The highest output achieved by a resnatron is 140 kilowatts at 450 megacycles, by a Westinghouse-developed model. Even then the power output was limited by the direct current supply; no resnatron has yet been pushed to the limit of its output because of this limitation.

Science News Letter, February 1, 1947

MEDICINE

Lichen as TB Weapon

Material from California Spanish moss appears to retard tuberculosis when given to guinea pigs. Further study will tell whether it can be used on humans.

➤ A NEW WEAPON against tuberculosis may have been found in long yellow crystals extracted from a lichen popularly known as California Spanish moss. This plant is not at all related to the Spanish moss of the Southeast, which is a higher seed plant belonging to the pineapple family.

Announcement of the discovery is made by Dr. Alfred Marshak in *Public Health Reports,* official publication of the U. S. Public Health Service. Dr. Marshak's studies were made under the federal health service's tuberculosis control division at the Hopkins Marine Station and The Rockefeller Institute for Medical Research.

The material "appears to retard the progress of the disease" in guinea pigs, Dr. Marshak cautiously states. Its value in human tuberculosis is not stated and probably will not be known without further study.

"A decisive weapon for the final victory over tuberculosis" will be created cumulatively by such research enterprise, is the editorial comment by Dr. Herman E. Hilleboe, assistant surgeon general, U. S. Public Health Service, under whose division Dr. Marshak's studies were published.

Further studies of the material on animals and, if justified, on human beings later, are in order, it appears from Dr. Hilleboe's comments.

When guinea pigs were infected with human tubercle bacilli, there were twice as many deaths in the control animals as in those treated with the lichen crystals, Dr. Marshak reports.

Untreated animals during the last two weeks of the experiment lost more than twice as much weight as the treated ones. On the basis of these facts and the autopsy findings Dr. Marshak concludes that "the group of animals treated with the crystalline substance showed much less disease than the controls."

The material was given in oil by daily hypodermic injections. No "obvious" toxic effects appeared.

Before the guinea pig trials, tests had showed that the material completely checked human tuberculosis germs in the test tube in concentrations of 1:50,000.

Although it also has an inhibiting effect against pneumococci, streptococci and some staphylococci, it did not show any ability to save mice from death when infected with type II pneumonia.

Details of chemical studies of the material, which has an empirical formula of $C_{16}H_{14}O_6$ are also given in the report.

Science News Letter, February 1, 1947

MEDICINE

Brain Tissue Extract May Rival Penicillin

➤ AN EXTRACT of brain tissue appears as a potential rival to penicillin as a weapon against infection with one kind of germ, Staphylococcus aureus, in studies by Dr. Leo G. Nutini and Sister Eva Maria Lynch of the Institutum Divi Thomae.

In tests on mice the brain extract was more effective than penicillin in preventing illness from the staphylococcus infection and in speeding recovery when given after infection had been established, the scientists report in the *Journal of Bacteriology* (Dec., 1946).

Staphylococcus aureus is familiar to most persons as the organism causing boils and abscesses but it may also cause more serious conditions such as meningitis, pneumonia and bone infection. The brain material effective against it may be extracted from either beef or human brain.

Science News Letter, February 1, 1947

PHYSICS

Successful V-2 Rocket Has Automatic Pilot

➤ A GERMAN V-2 rocket, equipped with an American developed automatic pilot system, has made a successful flight over the desert at White Sands, New Mex., Army Ordnance officials revealed.

The automatic pilot, which varied the altitude of the rocket in flight, was hailed as a forerunner of the first remote-controlled rocket.

Army officers said details of the performance of the new system are being tabulated but probably will be placed under military security. The rocket was fired Jan. 23.

The automatic pilot system, developed by the General Electric Company, has a small gadget, called the "wobbulater," which causes the rocket to weave up and down in flight by varying the gyro steering-control.

Although V-2's are being fired every two weeks, the next test of the new American control system will not be made for several months, Army officers said. Other flights use the steering controls which the Nazis developed for the missile.

Science News Letter, February 1, 1947

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AERONAUTICS

Crash Not Blamed on GCA

No one system is sufficient for bad-weather landing, authorities state. Radar operators radio directions to pilot who makes actual landing himself.

➤ THE CRASH of a Navy plane at the Oakland, Calif., airport recently while making a radar-directed landing in low-ceiling weather cannot be taken as a condemnation of the radar ground-approach equipment used, authorities in Washington state.

Tens of thousands of safe landings have been made, many in zero-zero weather, with this war-developed type of equipment called GCA for short. Both Army and Navy have used it extensively in America and in Europe, unassisted by any of the other instrument-landing devices. Many of these GCA landings were made by pilots who knew nothing of the method until they approached an overcast airfield and picked up instructions by radio which ordered them to maneuver and land as directed.

Directions by Radio

Basically, in the ground-control-approach landing system radar operators on the flying field near the runway pick up on scanning radar any approaching plane within some 20 to 30 miles regardless of darkness, clouds or fog, and direct its pilot by ordinary radio into position for landing. While one radar scope shows the position of the moving plane, another shows the end of the runway. By a process of superposing the shadow picture on one scope with that on the other, the relation of plane to runway is noted and instructions can be given the pilot to bring him into line with the runway and to lower him to land. The actual landing he makes on his own, taking over as soon as he can see the landing strip and the runway marker lights.

The GCA is a type of landing aid that will probably play an important part in commercial aviation in the future. The war-developed type of equipment needs adaptation before it can be installed in commercial airports satisfactorily. Already such conversion is being made. Three airports, in Washington, New York and Chicago, will have GCA apparatus in use by the middle of February. This apparatus is being located in the control tower at each port so that complete air traffic will be directed from one center. It is improved equipment that can be operated by only two men where the earlier types located in trucks on the field required five operators. For 24-hour operation seven days a week, eight operators are required, but this is much less than the 20 needed with the older equipment.

GCA Is Supplement

The Civil Aeronautics Administration, that has charge of the major commercial airports and is making these installations with the cooperation of the Army and the Navy, believes that the real function of GCA is to supplement its three-element instrument-landing system which is now installed in about 30 ports, with many other installations in the near future.

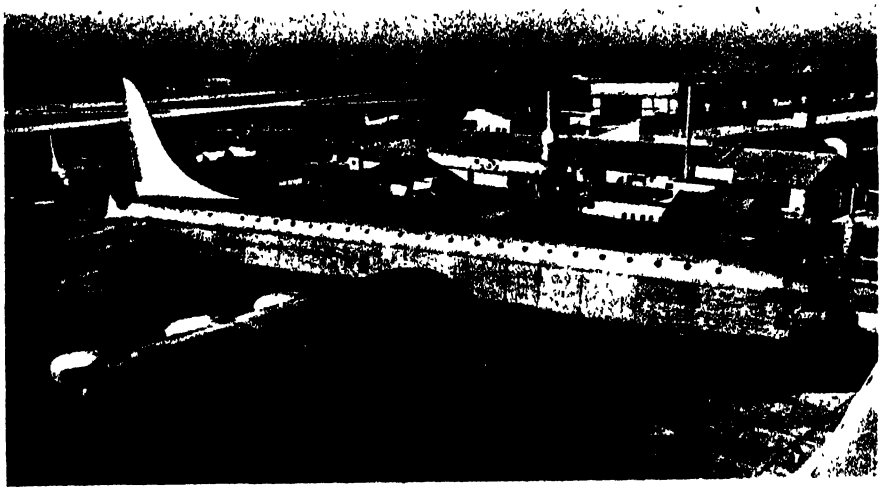
The three-element system utilizes radio-beam approach paths, glide paths for lowering to the runway, and radio-beam markers to give a pilot his distances from the runway. These latter are fan-like beams thrown vertically upward, crossing the path of the plane. In connection with this system an electronic automatic pilot is coming into use. This holds a plane on both the approach beam and the downward glider path more accurately, it is claimed, than it can be held by the average human pilot.

Experts are in agreement, it is understood, that no single one of the present bad-weather landing systems is sufficient by itself for all conditions. A combination may be the solution. However, whatever installations are made, they will be costly. With the three-element system, planes must be properly equipped. With GCA, no special equipment in the planes is required, but the ground equipment is expensive to construct, install and operate. The three GCA installations now being made will cost approximately $100,000 each, merely for conversion and installation.

Improvements in the present GCA are already on their way. A new long-range radar unit has been developed that will have a sweep range of 150 miles. Also a radar scanning unit is under development which will show on the scope only moving objects, eliminating the present confusion on ground based radar scopes that results from pulse reflections from neighboring towering buildings or other objects.

Science News Letter, February 1, 1947

CONTROL TOWER CONSOLE—This unit, developed by the Army Air Forces for air safety, incorporates all the utilities necessary to control air traffic that have been scattered throughout the tower.



XC-99—World's largest land-based aircraft, the Army Air Forces' XC-99 cargo and troop transport is nearing completion at Consolidated Vultee's plant in San Diego, Calif.

ENGINEERING

Oil Shale Yields Uranium

➤ URANIUM, used in generating atomic energy, is one of several byproducts obtained in producing oil from shale in Sweden, the American Chemical Society was told by Dr. Gustav Egloff, director of research of the Universal Oil Products Company.

The shale, he said, is radioactive and contains about 220 grams of uranium oxide per ton, or nearly half a pound. It contains also aluminum, vanadium and molybdenum, valuable products for which the Swedish government is seeking profitable uses in an effort to make the shale-processing program self-sustaining.

Progress in producing oil from oil shale in any part of the world is of interest in America because the United States has an estimated 100,000,000,000-barrel oil reserve in its shale which will rapidly come into use as natural petroleum reserves decrease. Industrial production of shale oil in Sweden is centered in a $25,000,000 plant at Kvarntorp, where 2,000 barrels a day are refined. The residual spent shale is used as fuel in boilers for the generation of electricity.

Heat from electric heaters is used to force oil up out of the shale through pipes in the form of vapors, he stated. Temperatures required are near 1,000 degrees Fahrenheit, and it takes three months to heat the deposit. Two months are then required to distill the underground shale. Normally, about 30 years would pass before the earth had cooled to its original temperature. While heated, the soil produces vegetation at unusual speeds and of greatly increased size.

Science News Letter, February 1, 1947

AERONAUTICS

One-Ton Liaison Plane Clears 50-Foot Obstacle

➤ A ONE-TON plane, one of the first designed especially for liaison work, is revealed by the Army. It will be known as the Boeing L-15A and can clear a 50-foot obstacle within 600 feet of take-off.

The L-15A will be used by the Army principally for reconnaissance, observation, aerial photography and emergency supply operations. It is an all-metal two-place plane, powered with a 125-horsepower Lycoming engine, has a normal cruising speed of 100 miles an hour, and can remain aloft two and a half hours at this speed.

A distinguishing feature of the new plane is its gondola, which houses the powerplant, pilot and observer, and takes up the entire fuselage. A long boom, extending to the rear of the top of the gondola, supports the plane's two rudder controls. With its high wings and boom, full visibility in all directions is available to the pilot and observer. The plane is so constructed that it can be quickly taken apart for shipment by truck.

Science News Letter, February 1, 1947

AERONAUTICS

B-36 Brother, XC-99, Is Being Completed

➤ A CARGO brother of the Army's biggest bomber, the B-36, has rolled out of the Consolidated-Vultee shops, is being completed, and will be ready for flight tests in April, it is expected.

Like the B-36, which made its initial flight late in the summer of 1946, the brother plane, the XC-99, can carry a load of 100,000 pounds, or could carry 400 passengers. Both have a wingspan of 230 feet and a length about four-fifths of this distance. Their 57-foot tail surfaces stick up in the air to the fifth-story windows of an ordinary office building.

The XC-99 is designed to carry airborne divisions of the Army as well as cargo. It is powered by six Pratt-Whitney engines of the pusher type, turning 19-foot reversible pitch propellers. With reduced loads, it will have a range of 8,000 miles at a speed in excess of 300 miles an hour.

Both the B-36 and the XC-99 are roughly 40% larger than the famed B-29 Superfortress. The cargo plane has a carrying capacity about 10 times as great as the Army's C-82 flying box car, the Fairchild Packet, into which a loaded truck can be driven up a ramp to its wide rear doors. It has three times the carrying capacity of the C-54, the standard big transport of the war. This is the four-engined Douglas Skymaster, built in several models, one of which was equipped for the personal use of the President of the United States.

Science News Letter, February 1, 1947

AERONAUTICS

Device Warms up Noses Of Planes for Take-Off

➤ IT IS a notorious fact that airplanes can't take off when their noses are cold. To speed the warming-up process, especially on muddy, slushy or snowy fields, Thomas F. Spackman of Chicago has devised a highly compact, mobile heater using liquid fuel and delivering hot air to the desired spots through collapsible ducts. It has both wide-tired wheels and broad sled runners, either of which can be swung into action in a moment, according to the condition of the ground. Rights on patent 2,414,214 are assigned to the Stewart-Warner Corporation.

Science News Letter, February 1, 1947

MEDICINE

Caronamide Aids Penicillin

Chemical increases penicillin concentration in blood, and possibly will increase the effectiveness and decrease the frequency of doses of penicillin.

➤ BETTER RESULTS in penicillin treatment may result from a new chemical. It causes a three-fold or better increase in penicillin concentration in the blood than is otherwise attained by a dose of the mold chemical.

The new chemical, called caronamide for short, is announced by Dr. Karl H. Beyer of Sharp and Dohme's Medical Research Division in a report in *Science* (Jan. 24).

Caronamide was made to fit specifications for a compound that would check the rapid excretion of penicillin by the kidneys. In drawing the specifications for such a compound, Dr. Beyer took advantage of a known mechanism of kidney cells. One scientist who has made a long study of kidney physiology says it is the first time this mechanism has been taken advantage of for the purpose of treating disease.

The mechanism is the one by which cells lining little tubes in the kidneys, called tubules, can take penicillin out of the blood stream, transport it across the cell and dump it into the lumen or clear space in the tubule. Once in the tubule lumen, penicillin is rapidly excreted from the body. About four-fifths of each dose of penicillin is lost this way within two or three hours.

Previously scientists have tried to stop this rapid excretion of penicillin by giving either diodrast or another chemical, p-aminohippurate, which are excreted by the same mechanism. Giving either of these with penicillin saturates the mechanism by a "mass action."

The penicillin excretion mechanism works through an enzyme. Scientists have been able to check the action of other enzymes by chemicals which successfully competed with the enzyme for other chemicals the enzyme required. So Dr. Beyer wrote his specifications for a chemical that would successfully compete with the kidney tubule penicillin excretion enzyme. Other specifications were for reversibility of the process, lack of effect on any other kidney mechanism and lack of toxicity.

Caronamide, or 4^1-carboxyphenylmethanesulfonanilide, was synthesized to these specifications by the organic chemistry department of the Sharp and Dohme laboratories. Tests on dogs and humans showed that caronamide achieves the purpose for which it was made.

As a result, it is expected that penicillin will be more effective and can perhaps be given in less frequent doses. Typhoid fever, brucellosis and subacute bacterial endocarditis, which is a kind of heart disease, are among the highly resistant infections which may yield to combined treatment with penicillin and caronamide.

Science News Letter, February 1, 1947

PHYSICS

Amplified Radio Frequencies Identify Chemical Elements

➤ THE NUCLEUS of an atom is turned into a miniature radio transmitter, sending out a signal that identifies the atom, in a new technique developed by Dr. Felix Bloch in collaboration with Dr. William W. Hansen and Martin Packard, all of Stanford University.

Amplified radio frequencies reproduced on an oscillograph screen show the observer what frequency the atom responds to. Each element has a characteristic frequency to which it resonates in a magnetic field under the influence of radio-frequency electric current.

Test materials are first placed in tiny glass vials in the field of a powerful electro-magnet. Spinning the vials in the magnetic field induces a radio-frequency current into the nuclei of the atoms. When the nuclei are spinning at right angles to the field, the frequency of the signal from the atom can be determined by a sensitive receiver, revealing the identity of the element.

The nucleus of a hydrogen atom, a proton, will whirl as fast as 42,500,000 times a second in a powerful magnetic field. Dr. Bloch has been using protons in his testing which has revealed the hydrogen in solution or in paraffin.

Dr. Bloch said that the technique is not yet ready for practical scientific work.

Science News Letter, February 1, 1947

The wooly *coat* of a lamb draws itself more closely about the animal in rainy weather, thus sealing in the natural heat of the body; the increased moisture and the animal's heat cause the wool to curl more tightly.

CHEMICAL ANALYSIS—Dr. Felix Bloch (right), professor of physics at Stanford University, and Dr. W. W. Hansen, director of the Stanford Microwave Laboratory, examine the equipment used in their research work on qualitative analysis by radio frequency.

Directions: Four possible answers are given for each question. Put an X in the answer box corresponding to the number of that answer which you think is most nearly correct.

PART A

1. To what does the word *Cassiopeia* refer?
( ) 1. a constellation in the northern latitudes
( ) 2. a large flightless bird of the Pacific
( ) 3 one of the earliest used of all spices
( ) 4. the mineral (SnO_2), the principal ore of tin

2 Which of the following is NOT a bone?
( ) 1. femur
( ) 2. humerus
( ) 3. thalamus
( ) 4. tibia

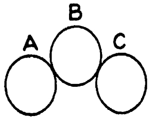
3. All mechanical energy is either
( ) 1. electrostatic or potential
( ) 2. electrostatic or radioactive
( ) 3. kinetic or potential
( ) 4. kinetic or radioactive

4 Which of these fits least with the other three?
( ) 1. larynx
( ) 2. pharynx
( ) 3. thorax
( ) 4. trachea

5 Which of the following is the most frequent use of blood typing?
( ) 1 aid to physicians in selecting proper antigenic sera for patients
( ) 2 establishment of non-paternity in cases of litigation
( ) 3 insurance of compatibility of blood of donor and donee in blood transfusions
( ) 4. prediction of length of life

6 Which of the following planets has the greatest number of known satellites?
( ) 1 Mars
( ) 2. Pluto
( ) 3. Saturn
( ) 4 Uranus

7 When wheel A turns counterclockwise



( ) 1. B turns clockwise and C clockwise
( ) 2. B turns clockwise and C counterclockwise
( ) 3. B turns counterclockwise and C clockwise
( ) 4. B turns counterclockwise and C counterclockwise

8. If a situation in which all A is C and all B is C changes to one in which all A is B and all B is C, then
( ) 1. all A is C
( ) 2. all B is A
( ) 3. all C is A
( ) 4. all C is B

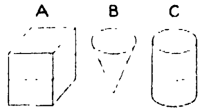
9. Which of the following is NOT one of the three great classes of organic compounds in cells?
( ) 1. carbohydrates
( ) 2. fats
( ) 3 proteins
( ) 4 salts

10. The word *sternum* refers to the
( ) 1 breast bone
( ) 2. dorsal side
( ) 3 lower tip of the spine
( ) 4 pelvic girdle

11 What is the biological science which deals with the relations of organisms and the environment, including relations to other organisms?
( ) 1 botany
( ) 2 ecology
( ) 3 helminthology
( ) 4 zoology

12. *Bryophytes* are forms of
( ) 1 animal life
( ) 2 minerals
( ) 3 plant life
( ) 4 stars

13 Containers A, B, and C are of the same height and diameter A and C are half filled, and B three-quarters filled with a normal salt (NaCl) solution Which container contains the least water?

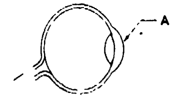


( ) 1 A
( ) 2 B
( ) 3. C
( ) 4. All contain equal amounts

14 Which of the following terms does NOT apply to all of the following. manatee, dugong, whale, and seal?
( ) 1. aquatic
( ) 2 herbivorous
( ) 3. mammalian
( ) 4. multi-cellular

15 Which of the following is an element?
( ) 1. salicylate
( ) 2. salientia
( ) 3. samarium
( ) 4. sanidine

16. In this sketch of a horizontal section of the eyeball, A indicates the
( ) 1. cornea
( ) 2. fovea
( ) 3. iris
( ) 4 retina



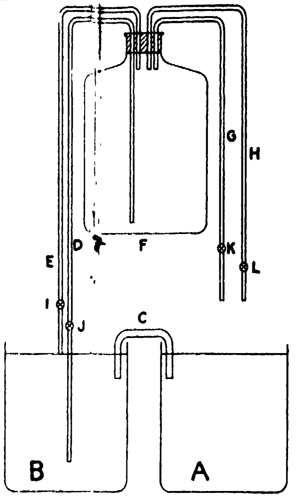
DIRECTIONS: Read each Section carefully. The questions following each Section are based on the information given. In other words, the answers to the questions are dependent in some way on the materials of the Section to which they belong. Four possible answers are given for each question. Put an X in the answer box corresponding to the answer which you think is most nearly correct.

PART B

63. While line D is in operation, which clamps must be open and which closed?
( ) 1. J open. I, K, and L closed
( ) 2 I, J open: K and L closed
( ) 3 K, J open: I and L closed
( ) 4. L, J open: I and K closed

SCIENTIST SEARCH—This sample of the aptitude test given to high school seniors in the Science Talent Search can give you an idea of how much science talent you have. Many competitors reached this examination and gave up, showing they did not have the perseverence to be scientists. Winners had to meet other requirements also, including writing an essay on "My Scientific Project." Answers are on page 76 to help you test your talent in science.

SECTION C: The diagram shows a water level regulator for a series of high temperature baths. A and B are the baths, while F is the reservoir bottle, placed on a shelf above A and B I, J, K, and L are clamps D, E, G, and H are tubes



QUESTIONS ON SECTION C

61 The chief function of tube E is to
( ) 1 carry water from B to F
( ) 2 carry water from F to B
( ) 3 cut off the flow of water through D
( ) 4 fill F

62 If tube E were used to fill the reservoir bottle,
( ) 1 both G and H would be unnecessary
( ) 2 both K and L should be closed
( ) 3 K or L should be open
( ) 4 the level in A could not be maintained

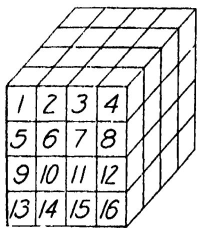
101 "The process of ascribing a numerical value to an object or quality either on the basis of the number of times some given unit quantity is contained in it, or on the basis of its position in a series of greater and lesser quantities of like kind," is a definition of what? (*Answer in less than 5 words.*)

102 Two sides and the included angle of one triangle are equal, respectively, to two sides and the included angle of another triangle What conclusion can you draw? (*Answer in less than 10 words.*)

103 A single *fixed* pulley is a form of lever with equal arms. There is no gain in force in the use of a fixed pulley Why? (*Answer in less than 15 words.*)

104 Where the soil supports a rank growth of vegetation, and especially if it has a thick forest cover, erosion by rain wash and gullying is greatly hindered and it may be almost entirely prevented Give one reason for this
(*Answer in less than 40 words.*)

SECTION I Imagine a 4" cube made up of 64 one-inch cubes, each numbered as shown in the diagram. No. 17 is directly back of 1, and 33 is directly behind 17, etc The location of cubes also can be described in terms of a rectangular coordinate system For any arrangement of the cubes, the origin of the coordinate system shall be the lower left front corner. For example, as the cubes are arranged in the diagram, cube 13 is located in position 1, 1, 1 Cube 17 is located in position 1, 4, 2 and cube 52, in position 4, 4, 4



QUESTIONS FOR SECTION I

90. A hole was drilled through the center of cube 10 and on through the intervening cubes through the center of cube 58. Similarly a hole was drilled from cube 34 to cube 46. What cube has thereby two holes drilled through it?
( ) 1 38
( ) 2. 42
( ) 3. 50
( ) 4. 66

91. Which of the following pairs of cubes are closest together?
( ) 1 3 and 35
( ) 2 29 and 45
( ) 3 32 and 33
( ) 4 59 and 61

92. If all the cubes were thoroughly mixed and only one cube drawn at random, what are the chances that its number would contain the digit 3?
( ) 1 1 in 4
( ) 2 5 in 16
( ) 3. 7 in 16

PART C

122-126

Below in Column III are listed the names of some outstanding American scientists In column IV are listed several fields of science For each scientist in Column III, put the number of his field of science (Column IV) in the parentheses at the left of his name.

Column III	Column IV
122. ( ) Adams, Roger	1 Astronomy
123. ( ) Compton, Arthur H.	2. Botany
124 ( ) Kettering, C. F.	3. Chemistry
125 ( ) Shapley, Harlow	4 Engineering
126 ( ) Thorndike, Edward L.	5 Geology
	6. Physics
	7. Psychology

Below are a number of statements. Some reflect recent developments or achievements in science, while others are false statements Mark each true statement with an X Mark each false statement O

( ) 127. Jets of air are discharged at the tips of rotor blades of helicopters to improve the efficiency of the vertical climb in aircraft
( ) 128 Fighter planes equipped with reversible pitch propellers are enabled to reverse their direction more rapidly than planes without such propellers.
( ) 129 Not over one-tenth of the stars in our galaxy are closer to its center than is our sun.
( ) 130 Prehistoric skulls with filed teeth have been discovered in the 1940's for the first time in the Mississippi Valley.
( ) 131 Crown gall of plants, often called plant cancer, has been cured by the application of crude penicillin
( ) 132 DDT successfully wiped out gypsy moth caterpillars on a test woodland tract
( ) 133. Manufactured gas, unlike natural gas, has been found harmless to potted plants and cut flowers
( ) 134. Quinine has been synthesized from a coal-tar derivative

GENERAL SCIENCE

Test Your Scientific Ability with This Sample

➤ IF YOU HAVE wondered what kind of ability it takes to be a scientist, here is a chance to find out.

Try to answer the questions of this section of a science aptitude test that has just been given to thousands of high school seniors. It will take about 40 minutes to do all the questions, but you can try a few of them for your amusement in less time.

You will have as a result some idea of the kind of problems that a scientist has to tackle and you can decide for yourself whether you have or like to use the reasoning ability scientists must use.

Some of the high school seniors who tried the Science Talent Search aptitude test this year took one look at the questions and decided that they could not do it. They might have had too low an estimate of their ability because the test was made quite difficult by intention to eliminate those students who do not have the perseverance to finish a job, a prime requisite for research.

You, too, can take one look at the questions and then decide not to try them. That is your privilege, of course. But you may be failing on determination to do a job, not potential scientific ability.

More than the aptitude test, sampled here, was used in picking the boys and girls who are judged to be scientifically gifted. The aptitude test was only one hurdle in the selection method.

The questions on this page are reproduced from the aptitude test of the Sixth Annual Science Talent Search. Thousands of boys and girls in their senior year in the nation's secondary schools took the full test as part of their entry in the search. Three hundred were selected for honors and 40 were invited to the Science Talent Institute at Washington, Feb. 28-Mar. 4, to compete for $11,000 in Westinghouse Science Scholarships.

Try these test questions on a friend—or yourself. Finish all questions in one sitting and do not look at the answers, printed on page 76, until you are through.

In addition, each contestant filled out a personal data blank and wrote an essay describing some scientific project he has done or wishes to do. Teachers filled out a recommendation form and principals reported scholarship. All are used in choosing winners.

(*Turn to page 76*)

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reservoir bottle, placed on a shelf
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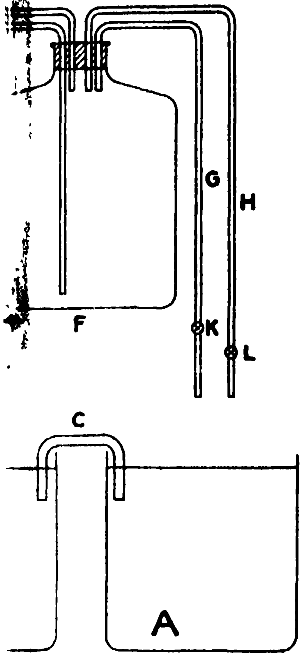

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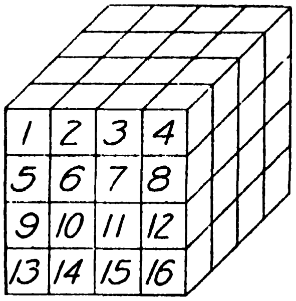

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Test Your Scientific Ability with This Sample

➤ IF YOU HAVE wondered what kind of ability it takes to be a scientist, here is a chance to find out.

Try to answer the questions of this section of a science aptitude test that has just been given to thousands of high school seniors. It will take about 40 minutes to do all the questions, but you can try a few of them for your amusement in less time.

You will have as a result some idea of the kind of problems that a scientist has to tackle and you can decide for yourself whether you have or like to use the reasoning ability scientists must use.

Some of the high school seniors who tried the Science Talent Search aptitude test this year took one look at the questions and decided that they could not do it. They might have had too low an estimate of their ability because the test was made quite difficult by intention to eliminate those students who do not have the perseverance to finish a job, a prime requisite for research.

You, too, can take one look at the questions and then decide not to try them. That is your privilege, of course. But you may be failing on determination to do a job, not potential scientific ability.

More than the aptitude test, sampled here, was used in picking the boys and girls who are judged to be scientifically gifted. The aptitude test was only one hurdle in the selection method.

The questions on this page are reproduced from the aptitude test of the Sixth Annual Science Talent Search. Thousands of boys and girls in their senior year in the nation's secondary schools took the full test as part of their entry in the search. Three hundred were selected for honors and 40 were invited to the Science Talent Institute at Washington, Feb. 28-Mar. 4, to compete for $11,000 in Westinghouse Science Scholarships.

Try these test questions on a friend—or yourself. Finish all questions in one sitting and do not look at the answers, printed on page 76, until you are through.

In addition, each contestant filled out a personal data blank and wrote an essay describing some scientific project he has done or wishes to do. Teachers filled out a recommendation form and principals reported scholarship. All are used in choosing winners.

(Turn to page 76)

Do You Know?

Iodine is one of the essential food nutrients required for adequate nutrition of farm livestock and poultry.

Sandblasting metal surfaces before painting is the only method, it is claimed, which thoroughly cleans steel of everything, including mill scale.

Cold-blooded *frogs,* when they thaw out of hibernation in the spring, immediately break into song, each to his own refrain.

Acetylene black, a chemical powder, when injected into the inner tubes of automobile tires, collects and dissipates the static electricity which is generated in the tire by friction.

Germany, Italy and Japan are the *least* provided of all large nations with important metals and minerals such as oil, iron ore, copper, tin, bauxite, iron-alloy metals, gold and asbestos; Italy also lacks coal.

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From Page 73

The test was devised for the Science Talent Search by Dr. Harold A. Edgerton, professor of psychology, Ohio State University, and Dr. Steuart Henderson Britt, psychologist, New York City.

Of the thousands of boys and girls who have taken the examination, not one made a perfect score. When you try this selection of questions from the examination you should, therefore, not expect to find that you have checked all the right answers.

To save your time, only typical questions out of the original three-hour examination are reproduced on this page. You should be able to answer the 39 questions in about 40 minutes.

Don't read further. Cover up the following paragraph until you have taken the test.

The correct answers to part A are: **1,** 1; **2,** 3; **3,** 3; **4,** 3; **5,** 3; **6,** 3; **7,** 2; **8,** 1; **9,** 4; **10,** 1; **11,** 2; **12,** 3; **13,** 2; **14,** 2; **15,** 3; **16,** 1. The right answers to Part B include: **61,** 3; **62,** 3; **63,** 2; **90,** 2; **91,** 2; **92,** 1. In Part C any wording which expresses clearly the following ideas is correct for the first three questions: **101,** measurement, or process of measurement; **102,** the triangles are congruent, the same or equal; **103,** distances moved by the load and applied force are equal.

Either of the following ideas for question **104** is correct: the mass of roots distributed through the soil, together with the mat of organic matter on the surface, holds the soil firmly in place and enables it to resist the pressure of the moving water; or, the mat of vegetation acting like a sponge absorbs the water and permits it to drain off so slowly that the destructively erosive effect of sudden rushes of water after storms is prevented. The items of column III of questions **122** to **126** should have the following numbers beside them in this order: 3, 6, 4, 1, 7. Your true and false marks should appear as follows: **127,** X; **128,** O; **129,** O; **130,** X; **131,** X; **132,** X; **133,** O; **134,** X.

If you are a man and answered correctly 25 of the questions, or if a woman and gave the correct answer to 21 to 22 of them, you did about as well as the average high school student completing the examination. But remember, all of the youngsters taking the exam are superior students. Those of you who answered 33 to 35 of the questions correctly are probably gifted in science.

Science News Letter, February 1, 1947

RADAR

Metascope Detects Signals Sent by Infra-Red Rays

➤ INVISIBLE enemy night signals and communication of spoken messages by infra-red rays were detected by Americans by use of an instrument, details of which are now revealed, that converted the "black light" radiation into visible images.

The instrument, called the metascope, was developed at the American Optical Company by a group of scientists headed by Prof. Brian O'Brien of the University of Rochester. The principal elements of the pocket-sized telescope include a correcting lens, a spherical mirror, a phosphor for converting invisible infra-red rays into visible light, and an eye-piece lens system.

A Schmidt-type correcting lens is an important part of the device. Prior to the war there were less than a dozen lenses of this type in the world, and these were used in high-speed astronomical photography. Production was a slow hand process. American Optical Company scientists, however, developed a method by which lenses for the metascope were rapidly produced. This made the infra-red detector possible.

Science News Letter, February 1, 1947

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HEALTH

Body Heat Warms Feet

➤ MANY A PERSON tries to escape cold feet in winter by crowding an extra pair of socks or stockings into snug shoes. This is a mistake. If you need extra socks, wear oversized shoes with loose socks inside. Better than concentrating on foot gear, however, is to keep the body as a whole warm, scientists of the climatology and environmental protection section of the Office of the Quartermaster General advise.

Cold hands and feet, they point out, are the first result of general body cooling. When the body begins to cool, the main blood supply to hands and feet is automatically cut off. If the body is kept warm enough by clothing and exercise, the blood must flow to the feet and hands to keep the body cool. This will help keep the hands and feet warm.

Exercise to keep warm is good, but do not let the feet sweat if it can be avoided. This is because moisture greatly increases cooling. So remember to keep shoes and socks dry, protecting them from both the moisture of wet streets and roads and the moisture of sweat.

Foot covering that will average about an inch thick preferably with resistance to water penetration from rain or snow is advised by the scientists for cold weather.

If the feet do get cold, warm them gradually, massaging them with warm hands. Resist the impulse to rush to the fire or radiator to warm up when you come in from outdoors on a cold day. If you do stand in front of the fire or other heat source, turn your back to it while stamping your feet and clapping or wringing your hands to warm up the body as evenly as possible. Otherwise you may be in for chilblains.

Avoid sitting or lying for long periods with cold feet, the scientists warn. Sick or injured persons who cannot exercise to keep the feet warm should keep them elevated.

Science News Letter, February 1, 1947

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GEOLOGY

Bomb-Like Meteor Chunks May Have Hit Indiana

➤ DID CHUNKS of a falling meteor burst with atom-bomb-like violence over northern Indiana, a few hundred million years ago? There is some reason to believe that they did, states Robert S. Dietz, Urbana, Ill., geologist, in *Science* (Jan. 10).

A quarry near Kentland, Ind., has exposed evidence of some highly violent kind of disturbance in the St. Peter sandstone, a geological formation of great geologic age. Hitherto it has been assumed that the disruptions of the strata, elsewhere quite flat and even, had been caused by a half-smothered blow up of a volcanic pocket far below, in some long-gone period.

However, Mr. Dietz points out, the shape and position of the dislocated conical rock masses indicate strongly that the explosion took place above, not below, the disturbed zone. And the only imaginable source for such an explosion would be meteorites, heated to the shattering-point by their passage through the earth's atmosphere, and finally plunging into the ground.

In ages after their fall, the upper levels containing the meteorite craters, as well as the meteorite fragments themselves, were eroded away, leaving only the inverted-cone "roots" in the soft sandstone. Later still, during the Ice Age, a new covering of clay and soil was deposited over the eroded surface, burying the evidence until quarrying operations brought it to light again.

Science News Letter, February 1, 1947

Maple wood may take a place along with the black walnut long used in the fabrication of rifle stocks and handguards, tests by the U. S. Army show.

Atoms, Planets & Stars

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8—Our solar system in a nut shell. Shows our r lative distance to other stars
9—Our location in the Milky Way Galaxy, and time to reach nearest star.
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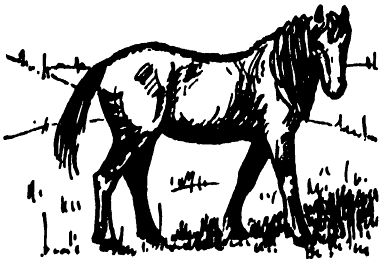

Equine Evolution

➤ HORSES became horses because grass began to grow on the earth, Prof. D. M. S. Watson of University College, London, points out. There were primitive horses on the earth before the first grasses appeared. The little eohippus, as well as several of his larger successors, never tasted grass. They chewed other forage, probably the green leaves and soft twigs of shrubs, as goats and deer do today. Evolutionary progress toward larger size and more specialized teeth was relatively slow.

Then, about midway through the Age of Mammals, perhaps thirty million years ago, grasses evolved. At the same time, sweeping climatic changes drastically reduced the amount of forest, which was replaced with open lands where grasses could move in and take possession.

Ancestral horses quit hovering around the brushy edges of the forests and ventured out onto the developing open plains. They evolved the present complex, high-crowned type of back teeth characteristic of horses, to grind their new food. Horses had become horses.

If grass was a positive factor in the evolution of the horse, bloodthirsty predatory animals served as a negative factor. They necessitated the development of his long, powerful legs and efficient hooves, which enabled him to get away fast when danger threatened. We owe the fleet horses of today largely to the patient selective efforts of long-extinct packs of wolves and similar beasts of prey, which picked off the slow specimens for food and permitted only the fastest to survive.

Science News Letter, February 1, 1947

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CERAMICS

Glass-Free Porcelain Fills High-Strength Needs

➤ GLASS-FREE porcelains, of particular value in airplane sparkplugs and radar transformers, have been developed by the National Bureau of Standards. Withstanding heat up to 2,000 degrees Fahrenheit, they will have many applications in high-temperature electrical installations.

In making these new porcelains such materials as alumina, beryllia, zirconia and thoria are used. Also added are minor quantities of other metallic oxides, but they contain no silica.

One is a high-beryllia porcelain containing 84% beryllia, 8% zirconia and small amounts of lime and alumina. Another contains 80% zirconia, 10% beryllia, and 10% magnesia.

The development of glass-free ceramic bodies has been a project of the Bureau since 1940, but it was pushed forward during the war to meet special needs. Modern applications demand a porcelain of high mechanical strength, particularly at elevated temperatures, and good resistance to thermal shock, properties not found in ordinary porcelain.

Conventional porcelains contain feldspar in the mixture which reacts as a flux with the clay and silica to form a certain amount of a liquid glass that fills the tiny spaces between the crystals. This glass softens and deforms under stress at temperatures much lower than those at which the crystalline parts liquefy. The strength of the porcelain is largely dependent upon the matrix of glass. For this reason a glass-free porcelain was desired.

Science News Letter, February 1, 1947

AERONAUTICS

Gas-Turbine, Jet-Propulsion Engines Power Navy XF2R-1

➤ WITH A GAS-TURBINE engine in front and a jet-propulsion engine in the rear, the new Navy XF2R-1 is a notable addition to speedy combat aircraft. It is an experimental plane and has now completed many tests in the air, the Navy revealed.

This new plane is the second fighter in the Ryan Fireball series. In the first the forward engine was of the conventional reciprocating type. The forward engine in this is a General Electric TG-100 "prop-jet" gas-turbine. The rear thermal jet engine is a General Electric I-16.

The use of the gas-turbine gives the XF2R-1 a long thin bullet-like nose. A large spinner on the hub of the Hamilton-Standard four-bladed propeller increases the streamlined effect. The new plane, with a wing span of 40 feet and an over-all length of 36 feet, will probably be in the 500-mile-an-hour class.

Science News Letter, February 1, 1947

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Books of the Week

ADJUSTMENT TO PHYSICAL HANDICAP AND ILLNESS: A Survey of the Social Psychology of Physique and Disability—Roger Barker, Beatrice Wright and Mollie Gonick—*Social Science Research Council,* 372 p., illus., paper, $2. Bul. 55, 1946.

APPLIED PLASTIC PRODUCT DESIGN—Robert Davis and Ronald Beck—*Prentice-Hall.* 285 p., illus., $6. Plastic product design principles for use by engineers and students in plastics.

CAN SCIENCE SAVE US?—George A. Lundberg—*Longmans,* 122 p., paper, $1; cloth, $1.75. A University of Washington sociologist outlines the possibilities that the scientific method, applied to all social problems, presents our best hope of achieving a better society.

CHEMISTRY FOR OUR TIMES—Elbert C. Weaver and Laurence S. Foster—*McGraw-Hill,* 738 p, illus., $2.48. A basic first book for the high school student of chemistry, stressing scientific principles, consumer approach, and the impact of chemistry on everyday life.

COYOTES—Wilfrid S. Bronson—*Harcourt, Brace and Co.,* 62 p., illus, $1.75. A natural science picture book for younger children, describing the habits of this wild, freedom-loving American animal.

THE EGO AND THE MECHANISMS OF DEFENSE—Anna Freud—*Int. Univs. Press,* 196 p., $4. The 1st American edition of a classic contribution to psychoanalytic ego-psychology.

ELEMENTS OF SOIL CONSERVATION—Hugh H. Bennett—*McGraw-Hill,* 406 p., illus, $3.20. Problems of soil erosion and soil exhaustion, and tested methods of solving these problems through modern soil conservation techniques. A condensation of the 1940 edition.

LADYBEETLES OF THE GENUS EPILACHNA (SENS. LAT.) IN ASIA, EUROPE, AND AUSTRALIA—G. H. Dieke—*Smithsonian Institution,* 180 p., illus., paper, $1. Smithsonian Misc. Collections, Publ. 3860.

RADIANT HEATING—T. Napier Adlam—*Industrial Press,* 472 p., illus., $6. Information on the use of hot water, steam, warm air, or electricity in radiant heating. Snow melting and radiant cooling are discussed.

SINGLE-SHOT RIFLES—James J. Grant—*Morrow,* 385 p., illus., $5. A study of those masterpieces of the gunsmith's art—the single-shot rifles, together with actual or original photographs.

Science News Letter, February 1, 1947

MEDICINE

Thrombin Stops Bleeding

➤ PATIENTS with hemorrhage from stomach ulcers or other stomach and intestinal conditions can have the bleeding stopped by swallowing a dose of thrombin, one of the blood's own clotting chemicals. A method of using this material effectively to stop bleeding from the stomach and upper intestinal tract was announced by Dr. Byrne M. Daly of Wayne University College of Medicine at the meeting of the American College of Surgeons.

Before swallowing the thrombin, the patients with hemorrhage swallow a couple of ounces of a phosphate solution and the thrombin is given dissolved in the same solution. The phosphate acts as a buffer to keep the acid in the stomach juices from inactivating the thrombin before it produces a clot at the bleeding point on the ulcer or stomach wall.

In each patient to whom Dr. Daly gave the buffered thrombin, the bleeding stopped, although it had been uncontrolled before and an operation was considered. Each patient had had repeated hemorrhages from ulcers seen in X-ray pictures or by the surgeon at operation.

Dr. Daly does not expect thrombin to control bleeding from the stomach in all cases, and said that final evaluation can only be based on trial in a long series of cases, but he believes it will be of much value in some cases.

Science News Letter, February 1, 1947

BOTANY

American Redwood Trees Have Chinese Relatives

➤ REDWOODS, long supposed to be an American monopoly, have been found growing in central China, Prof. Ralph Chaney, University of California paleobotanist, has disclosed. The information was sent to him by a Chinese botanist, H. H. Hu, who discovered three trees obviously closely related to our Sequoias in a temple grove.

Although the trees are closely akin to American Sequoias, they are sufficiently different to be included in a different genus, which has been named Metasequoia. Probably the trees owe their survival to their presence in the temple grove, where they were protected against cutting in a timber-short and fuel-starved land. Another ancient tree genus, Ginkgo or maiden-hair tree, now widely planted as an ornamental in this country, was similarly preserved in Asiatic temple groves.

Curiously enough, the name Metasequoia existed before the living trees were known to exist. For the trees found by Mr. Hu are identical with fossil remains of an ancient redwood genus found clear around the northern hemisphere, to which the name had already been given.

Science News Letter, February 1, 1947

ENGINEERING

Lack of Reservoir Sites Hinders Flood Control

➤ THE PROBLEM of flood control, particularly when combined with other functions of stored water such as navigation, irrigation, power and conservation, is becoming more difficult because of a lack of suitable reservoir sites. This is the opinion of Albert L. Cochran of the Army Chief of Engineers office, expressed to the American Society of Civil Engineers.

Requirements for storage capacity to control maximum floods cannot be altered simply by combining flood control with other functional uses. In reservoirs for multiple-purpose uses of water, definite schedules of operation are necessary for the best interests of all.

Science News Letter, February 1, 1947

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Science News Letter, February 1, 1947

WALL SAFE, for home and office, has a one-piece body, solidly cast in high-carbon, drill-proof steel. It is easily mounted between wall-studding by lugs that are a part of the body. Its four-tumbler lock has a three-bolt action, giving 140,000 combination changes.

Science News Letter, February 1, 1947

PLASTIC-COATED steel pipe, developed for oil-well drilling to protect the tubing from corrosion, are usable in other industries. The coating is impervious to oil and water, withstands high temperature, and resists mild chemical attack.

Science News Letter, February 1, 1947

ROTARY SPINDLE and quench ring are combined for use with any type of induction heating equipment where heat-treating of machine parts requires rotation during treatment. Driven by water power, the speed of this portable unit is controlled by varying the water flow.

Science News Letter, February 1, 1947

HINGED SEAT, and a pair of steps on each side of a farm tractor, enable an all-day operator to stand at his work to get relief from constant sitting. The locked-down seat is released by a trigger and quickly raised; the steps are treated with a non skid material.

Science News Letter, February 1, 1947

PLASTIC HANDLES, molded to fit the hand as shown in the picture, feature new carving sets now available. To design the handle, hand and palm impressions were taken with modeling clay.

Science News Letter, February 1, 1947

FLARES of the reflector type, to warn approaching motorists of stalled vehicles on the road, have plastic lenses made from a red molding powder. They give a red warning signal visible a half mile. With swivel type legs, the flares can be quickly mounted in the road.

Science News Letter, February 1, 1947

FIRE DETECTOR for farm buildings and industrial plants is an electrically controlled watchman that uses a system of strategically placed thermostats. Warning is given on a central dial where a red light is flashed, a bell rung, and the location of a fire indicated.

Science News Letter, February 1, 1947

MATTRESS for hospital incubators is made of very fine fiber glass which does not stain, mildew, absorb moisture or retain odors. The fibers are resilient and do not pack down in use, and, being made of inorganic materials, contain no allergy-producing substances.

Science News Letter, February 1, 1947

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 347. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.*

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Question Box

AERONAUTICS

In what are B-29s stored? p. 66.

What is the three-element landing system? p. 69.

ENGINEERING

Why is America so interested in oil production from oil shale? p. 70.

EVOLUTION

How did horses become horses? p. 78.

HEALTH

How can you keep your feet warmer in winter? p. 77.

MEDICINE

How does caronamide aid penicillin? p. 71

What change is the veteran bringing about in nursing? p. 74.

Why is a phosphate solution given with thrombin to stop hemorrhage? p. 79.

NUCLEAR PHYSICS

How long do the experts say it will be before we have low-cost atomic power? p. 66.

PHYSICS

What will be resnatron's peacetime job? p. 67.

Where published sources are used they are cited.

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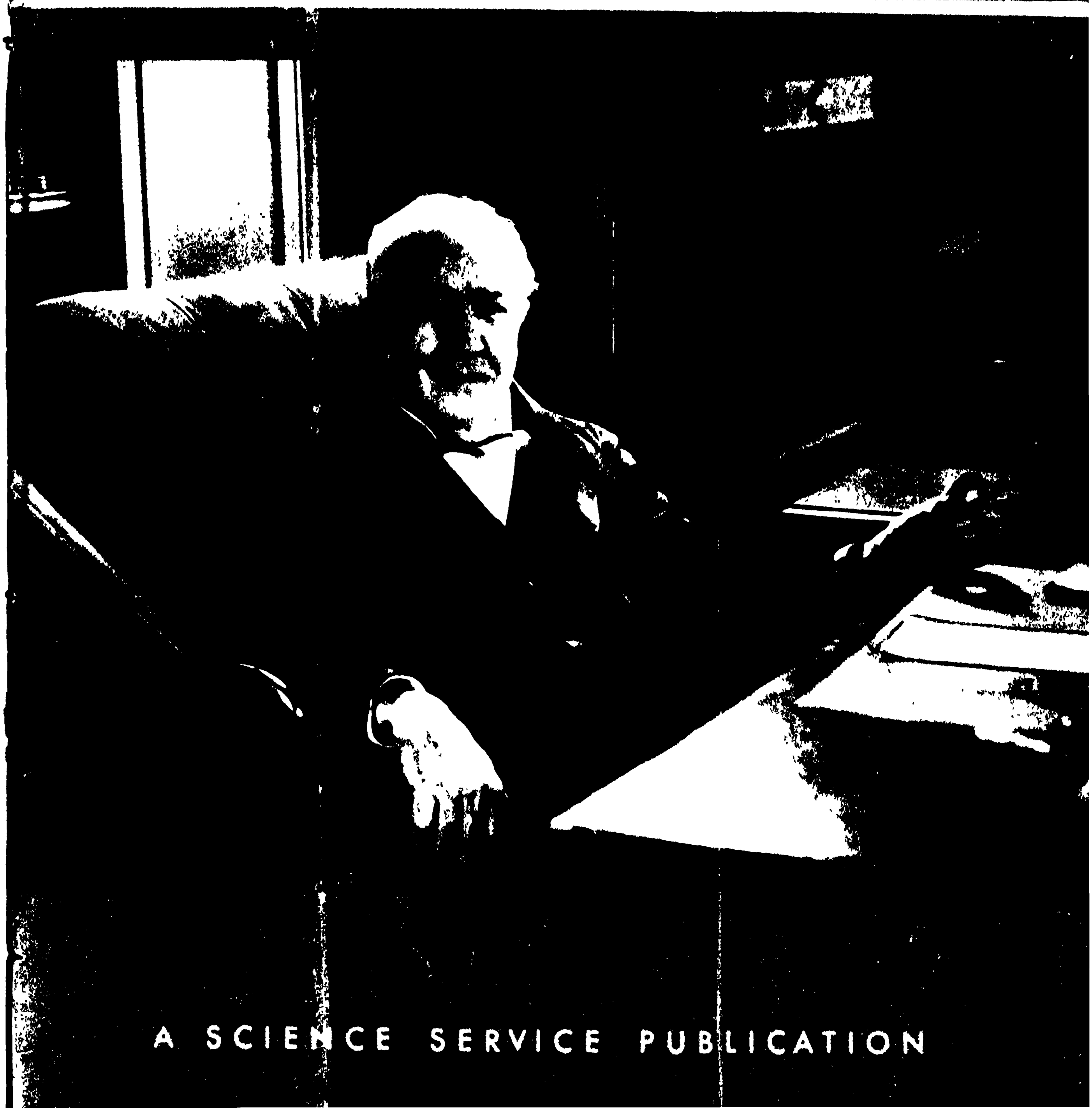
SCIENCE NEWS LETTER



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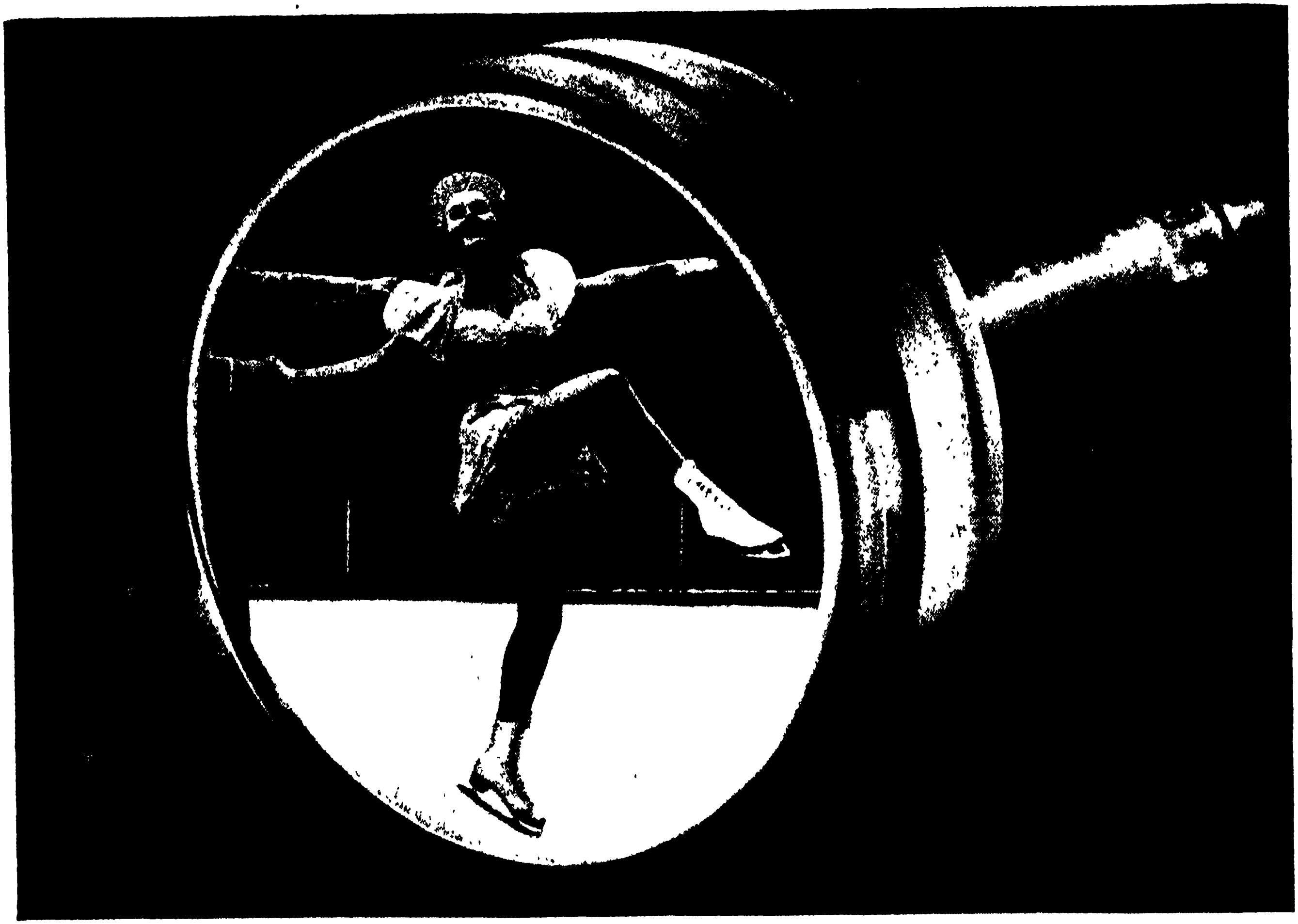

Television today is clearer, sharper, and brighter—thanks to the improved kinescope, or picture tube, perfected at RCA Laboratories.

The Picture Tube that brought "life" to television

The screen on your home television table model receiver is the face of a large picture tube. And the skater you see on the face of the tube is the *identical twin* of the skater being televised.

Pioneering and research in RCA Laboratories led to the development of this tube which allows none of the original realism to be "lost in transit." It reproduces everything the television camera sees, shows you every detail, keeps the picture amazingly lifelike and real.

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RADIO CORPORATION of AMERICA

CHEMISTRY

Three Elements Get Names

Elements 43, 85 and 87 receive names technetium, astatine and francium from their discoverers. Only element 61 is now without a name.

➤ THREE of the four still unnamed chemical elements have been christened.

The new names are technetium for element atomic number 43, astatine for element 85 and francium for element 87.

The discoverers of the elements have done the naming as is the custom in chemical circles. Technetium with Tc as its symbol was the first artificially made element, formed by neutron or deuteron bombardment of molybdenum in 1937 in the 37-inch cyclotron at the University of California. Dr. C. Perrier, now at the University of Genoa, Italy, and Dr. E. Segre of the University of California have now named it after the Greek word for "artificial". Later when the fission of uranium was accomplished it was discovered that one of the fission products is element 43 and relatively large amounts have been isolated as a by-product of atomic bomb research.

Element 85, now called astatine with At as its code name, in 1940 was also born in a cyclotron, a larger 60-inch one also at the University of California. It is one of the chemical group of halogens, to which chlorine, bromine and iodine belong. So the co-discoverers, Dr. Segre, Dr. D. R. Corson, now at Cornell, and Dr. K. R. Mackenzie, now of the University of British Columbia, named it from the Greek for "unstable" since it is the only halogen without stable isotopes or varieties. Astatine is made by bombarding bismuth with alpha particles.

Actinium K is the name previously given to element 87 by its discoverer, Mlle. M. Percy, who announced her new element in a French journal in 1939. Now she christens it francium, symbol Fr, after her country, just as Mme. Curie named the first element she discovered, polonium, after her native Poland.

This rash of new chemical element names announced in the British journal, Nature (Jan. 4), results from the suggestion of Prof. F. A. Paneth of the University of Durham that missing elements positively found should be christened so as to clear up the periodic table of the elements.

The last remaining unnamed chemical element among the 96 now discovered will be christened in April by a paper before the American Chemical Society meeting at Atlantic City.

Element 61 was positively identified among the fission products of uranium at Oak Ridge, Tenn., during experiments in 1945 by J. A. Marinsky and L. E. Glendenin. Dr. Charles D. Coryell, now at Massachusetts Institute of Technology, was associated in the work but does not consider himself one of the codiscoverers.

Two relatively fleeting varieties of this radioactive element were identified, one with an atomic weight of 147 that has a half life of 3.7 years and another with a mass of 149 with a half-life of only 47 hours.

Element 61 has been given the name of illinium on the basis of a reported discovery of some years ago that is not now generally accepted.

Chemical books and tables will in many cases show elements 43, 61, 85 and 87 as previously discovered and named as masurium, illinium, alabamine, and virginium. But the researches culminated in the newer names for three of these elements are being accepted as the real discoveries of these elements.

Four elements actually discovered since the ones now named have won a prompt place in popular speech as well as chemical literature, at least in the case of element 94, plutonium, one of the two atomic bomb elements. The others are 93, neptunium, 95 americium, and 96 curium, all made basically from uranium.

Science News Letter, February 8, 1947

MATHEMATICS

Electronic Computer Faster Than ENIAC to Be Developed

➤ AN IMPROVED electronic computer, that will handle figures in difficult arithmetical problems faster than earlier models, is under development at the Moore School of Electrical Engineering, University of Pennsylvania, it was revealed to the American Institute of Electrical Engineers by T. K. Sharpless.

ROCKET COMMUNICATION—A new light-weight electronic device to transmit information from rocket to ground was used in the V-2 rocket fired recently at White Sands, New Mex. (See SNL, Feb. 1.) General Electric engineers are shown testing the device.

He described ENIAC, the present computer used by the Army in solving problems connected with rockets, guided missiles and supersonic aerodynamics. The new machine will operate faster, "remember" 50 times as many numbers, and use only 3,000 electronic tubes instead of the 18,000 tubes in ENIAC. (*See SNL,* Jan. 25.)

ENIAC is a coined name for "electronic numerical integrator and computer." Illustrating the high speeds with which it can operate, Mr. Sharpless pointed out that ENIAC can multiply two ten-place numbers and give 20-place answers at the rate of 300 problems per second.

Another electronic high-speed computer, under development at the Servomechanisms Laboratory, Massachusetts Institute of Technology, was described by Jay W. Forrester, associate director of the laboratory. It will complete in five minutes calculations which would take a human operator one year, he said. It is being developed under the sponsorship of the Office of Naval Research.

Mr. Forrester listed many of the applications of automatic computing machines.

Science News Letter, February 8, 1947

ASTRONOMY

Milky Way Questions

Study of the astronomically-young Milky Way system may reveal whether our galaxy is a spiral galaxy with pinwheel arms.

➤ IS OUR Milky Way system a spiral galaxy, with pinwheel arms extending out from the brilliant center cluster of stars and luminous gases? Is the stellar system to which our sun belongs still in the process of being created? Questions such as these were raised at the Lowell Institute lecture in Boston by Dr. Bart J. Bok of Harvard College Observatory. He considers them among the outstanding problems which Milky Way astronomers will attempt to solve during the next quarter of a century.

All stars that are within reach of modern telescopes, with the exception of those obviously belonging to spiral nebulae and similar systems outside our own, are part of the Milky Way system, Dr. Bok pointed out. The general shape and outline of the system is known with a fair degree of certainty. The visible band of the Milky Way marks the central plane of the system.

The total mass of all stars in the system is probably around one hundred billion times the mass of our sun. But the stars are only half the story. The interstellar gas and cosmic dust in the spaces between the stars have a total mass just about equal to that of all stars together.

Our sun is far from the center of the system. The best current estimate places the sun 176 million billion miles from the central star clouds. The system is highly flattened, with a diameter 20 to 50 times as great as its thickest part.

The Milky Way system rotates around a central axis, moving at right angles to the galactic plane. Our sun and all the stars near it move around the center at a speed of about 150 miles per second. It takes our sun about two hundred billion years to complete one galactic revolution.

Exhaustive study of the stellar population in a dozen Milky Way fields may go far toward settling once and for all the question of the shape of the system to which our sun with its planets belongs. Modern Schmidt-type telescopes, equipped with suitable large prisms, are the instruments best suited for determining whether our system is a spiral galaxy, Dr. Bok pointed out. Large reflectors, like the 200-inch soon to be completed, by their ability to penetrate to the faintest stars can supplement the Schmidt by supplying complete data for small areas of the sky.

The distribution of star clusters, novae and other luminous objects, supported by the evidence from galactic rotation, places the center of our Milky Way system unmistakably in the direction of the Sagittarius star cloud. An exhaustive study of this section of the heavens has not yet been made. It can be done effectively today and must be done promptly, Dr. Bok emphasized.

Present indications are that our Milky Way system cannot have been as it is today for more than three to ten billion years. In other words, the age of our galactic system is put at between 15 and 50 galactic revolutions. We learn this from stellar motions, from the ever-present spendthrift stars that burn away rapidly their internal energy supplies, from calculations on the stability of clusters and from the observed recession of distant galaxies.

The relative youth of our Milky Way system affects all our thinking on variations in stellar population and on the interrelation between stars and interstellar matter. The abundance of interstellar matter and its tendency to aggregate in clumps of all kinds and sizes may be the best available evidence that our Milky Way system is still in the process of being built up.

Science News Letter, February 8, 1947

MEDICINE

Cancer Cells Change Species To Become Hybrid Units

➤ WHEN CELLS become cancerous they change their species and become hybrid cells. They are then quite independent of the cell organization in the body of which originally they were a part.

This theory of how cancer arises is presented by Dr. Robert G. Green, University of Minnesota Medical School cancer researcher, in *Science* (Jan. 24).

Whether cancer is caused by coal tar chemicals, by X-rays, ultraviolet radiation or radium, or by a virus, the mechanism of the cancer production seems to be basically the same, Dr. Green states.

Studies of the virus associated with breast cancer in mice led Dr. Green to this theory of the mechanism of cancer production. He found in these studies evidence suggesting that not only is the virus intimately associated with the cancer cell but also that the association is concerned with the species character of this cell.

The mouse breast cancer cell appears to be a mouse cell with a substituted virus species, from the immunological findings.

Science News Letter, February 8, 1947

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GEOLOGY

Model Shows How Water Causes Pothole Erosion

➤ TO FIND OUT just how falling water rolls stones to grind the round cavities called potholes in solid rock, Walter B. Kamb, fifteen-year-old high school senior at Pasadena Junior College, has built an ingenious piece of apparatus in which all possible conditions of angle and force of water currents can be reproduced in miniature.

The device consists of a glass cylinder, with a movable piston for its bottom, so that a pothole of any depth can be simulated. Water is jetted in at any desired angle through an adjustable nozzle, and glass beads rolling on the bottom represent the stones that do the cutting. Some very curious effects are obtained by changing angle of flow and depth of cavity, even to a complete reversal of the direction of rotation at the bottom.

Potholes are now being formed at the bases of many waterfalls. "Fossil" potholes are abundant in rocky parts of the country that were glaciated during the Pleistocene ice age; they were cut by stones kept in motion by streams of water flowing out from under the melting glacial fronts.

Mr. Kamb is a winner in the Sixth Annual Science Talent Search for the Westinghouse Science Scholarships. With 39 others, he will attend the Science Talent Institute in Washington, D. C., Feb. 28 through March 4.

Science News Letter, February 8, 1947

ENGINEERING

Standardization to Benefit Household Motor Servicing

➤ HOUSEHOLD electric motors on refrigerators, washers, pumps and fans will be more easily serviced as the result of the standardization of small motors by the National Electrical Manufacturers Association, C. P. Potter of Wagner Electric Corporation told the American Institute of Electrical Engineers.

Fractional horsepower motors, used in most houshold equipment, are not always interchangeable under past conditions because motor characteristics are frequently modified to suit the desires of the makers of various devices. The standardization will make replacements of motors easier as well as benefit servicing.

Science News Letter, February 8, 1947

SUBGLACIAL CHAIN—Meadows are shown some distance below this chain of subglacial potholes in this photograph taken by Walter B. Kamp, senior at Pasadena Junior College and a winner in the Sixth Science Talent Search.

MEDICINE

New Antibiotic Discovered

Streptomycin-relative weapon against germs has been discovered. Its value will lie in keeping germs from getting resistant to streptomycin.

➤ A NEW ANTIBIOTIC related to streptomycin has been discovered by Dr. Selman A. Waksman, famed Rutgers University and New Jersey Agricultural Experiment Station researcher who discovered streptomycin.

Grisein is the name Dr. Waksman has given streptomycin's sister weapon against germs. The name comes from the last part of the name for the organism which yields it and streptomycin, *Streptomyces griseus*. Grisein was discovered in a search for "bigger and better streptomycins," Dr. Waksman said.

The new antibiotic is no rival to streptomycin. By itself it shows no great promise as a weapon against germs. Its value, Dr. Waksman believes, will come from combining it with streptomycin to eliminate resistance which germs develop to streptomycin.

This development of germ resistance to antibiotics is the most important problem today in connection with the use of these modern remedies for infection, Dr. Waksman emphasized at the symposium on antibiotics held in Washington under the auspices of the U. S. Public Health Service's National Institute of Health.

Germ resistance to streptomycin may be even more important than resistance to penicillin. This, Dr. Waksman explained, is because streptomycin is used in chronic illnesses for which it must be given over a long period of time. Penicillin, on the other hand, is used for acute conditions from which the patient gets well quickly.

Streptomycin should, for example, give good resuts in undulant fever, but in practice it does not. This long drawn-out illness gives the germs a chance to develop resistance to the antibiotic. The same thing may occur in tuberculosis, for which streptomycin is now being tried.

Science News Letter, February 8, 1947

MEDICINE

Goiter Not Iodine Lack

Study shows that goiters and enlarged thyroid glands contain excess or normal amounts of iodine; therefore a lack of iodine probably does not cause condition.

➤ THE GENERALLY accepted theory that lack of iodine in food and drinking water leads to development of one kind of goiter is contradicted in a study by Dr. Isidor Greenwald of New York University College of Medicine.

A scientific controversy may well be started by Dr. Greenwald's findings which he himself terms "startling" in his report in the *Journal of Clinical Endocrinology.*

Recently State Senator Thomas C. Desmond, of Newburgh, N. Y., announced he was starting a drive to compel iodization of all table salt in order to prevent goiter. About the same time the State and Territorial Health Officers recommended federal legislation requiring the addition of iodine to all table salt.

The amount of iodine in goiters and large thyroid glands is greater or as great as the amount in normal glands, Dr. Greenwald points out. Consequently he says the cause of the goiter could not be a scarcity of iodine. He cites figures on the iodine content of goiters and thyroid glands from published reports starting with the discovery of iodine in the thyroid in 1896 to 1934, date of the latest publication on the subject.

A second point Dr. Greenwald makes against the iodine lack as cause of goiter theory is that proponents of the theory "have not properly controlled their analytical techniques nor their collection of food, water and excreta."

Giving iodine to people in so-called goiter belts has not reduced the incidence of new goiters to zero, he states on the basis of reports published by other authorities. Altogether Dr. Greenwald has critically reviewed over 100 scientific publications on the subject of lack of iodine causing endemic goiter. An increase in goiter is the reason given by State Senator Desmond for his drive to have all table salt iodized.

Starting point of Dr. Greenwald's study was his interest in history, he said.

Telling his students, as he did year after year, about the Great Lakes goiter belt, he one day wondered why in all his reading of history he had never found a reference to goiter among the Indians of the region. Digging into the history, he found instead mention of the fact that the Indians there did not have goiter. He was surprised that the early explorers would mention the lack of goiter in Indians. It would be expected that they would either report noticing goiters if these were prevalent, or fail to mention the condition if it were not present.

Having convinced himself by further study of history that goiter did not exist in the Americas or in New Zealand before the coming of the white men nor in England before the eighteenth century, he turned to his study of scientific reports. He is now planning experiments of his own on the thyroid gland. Previously he has investigated the physiology of the parathyroid glands and other problems of physiology and biochemistry.

Science News Letter, February 8, 1947

SOCIOLOGY

Help Cupid Shoot Straight

➤ WANT to get married?

Go west, young woman.

Go east, young man.

That is the best Valentine Day's advice that experts can give.

Yes, there may be many million young girls of marriageable age destined never to wear a ring on their third finger, left hand, because there just aren't enough men interested in marriage to go around. But that need not concern you. Of much more importance than the relative number of men in the United States is the number in your community—the number of eligible men you meet in business and society.

Girls on farms, in small towns and villages, may fret to get to big cities, but their chances of marrying will be better if they remain in their rural communities. Young men, on the other hand, run into less competition in winning the lady of their choice in a large city.

Young men seeking mates in general will find the largest choice in the eastern and southeastern states. Young women do better in the western states, irrespective of whether they live on a farm or in a city.

Nevada is a veritable woman's Paradise. The percentage of marriageable men to women is greater there than for any other state. A young man, on the other hand, would do well to seek his fair lady in North or South Carolina. There the sex ratio is decidedly in his favor.

To determine the best sections of the country for men and women interested in marriage, Dr. Paul Popenoe, general director of the American Institute of Family Relations at Los Angeles, Calif., worked out a table of sex ratios for all the states in the Union. He considered native-white single women, 20 to 29 years of age, as representing the marriageable women of this country. With them he compared "marriageable men" selected on the same basis, but 25 to 34 years old.

A man would have to face fewer competitors, Dr. Popenoe found, in the Carolinas, Rhode Island, Tennessee, Mississippi, Alabama, Minnesota, Georgia, Utah and Massachusetts. A girl would be likely to have more beaux from which to choose if she lived in Nevada, Wyoming, Arizona, Montana, California, Washington, Idaho, Oregon, Michigan and New Mexico.

While the states themselves are pretty good guides as to where to find a mate, where you live in that state may be even more important. Dr. Clifford R. Adams, director of the Marriage Counseling Service at Pennsylvania State College, found San Diego, Calif., the best city for girls and Madison, Wis., the most likely one for men. He reached this conclusion by comparing the number of white, single girls between 25 and 30 years of age with the number of white, single men aged 30 to 35.

Young men and women moving to another city should select their new domicile carefully. In a study of several thousand marriages in Philadelphia, Prof. James H. S. Bossard of the University of Pennsylvania discovered that one out of three of the young people applying there for a license lived within five blocks of each other. One in six of the marriage applicants were living less than one block from each other, and one in four lived only two blocks away.

Science News Letter, February 8, 1947

GENERAL SCIENCE-EDUCATION

STS Honorable Mentions

College entrance aid and honor go to 201 boys and 59 girls, who are given honorable mention in the Sixth Science Talent Search.

➤ HONORABLE MENTIONS to 201 boys and 59 girls in the Sixth Annual Science Talent Search for the Westinghouse Scholarships were announced by Watson Davis, director of Science Service.

The 260 youths awarded honorable mentions are located in 33 states and the District of Columbia. They were chosen from among some 16,558 entrants, of whom 3,197 completed the science aptitude examination, submitted recommendations and scholarship records and wrote essays on the subject, "My Scientific Project."

Forty top entrants previously have been announced as winners of trips to a five-day Science Talent Institute in Washington, Feb. 28 through March 4, where they will compete for $11,000 in Westinghouse Science Scholarships.

All 300 selected for honors will be recommended as students of unusual ability to scholarship-awarding colleges and universities.

Most of the honorable mentions in the five previous Science Talent Searches have been awarded scholarships, and many of those named this year will qualify for valuable scholarships and other financial assistance in the colleges, universities and technical schools of their choice. The judges found all 300 winners to be students of outstanding ability.

Among the honorable mentions 37% of the boys and 59% of the girls were first or second in their high school graduating classes. They have studied science for some years: 49% of the boys and 44% of the girls have had at least four years of high school science. A larger number has studied science for at least three years: 90% of the boys; 76% of the girls.

All of the honorable mentions have crowded records of extra-curricular activities. Science clubs are among the more popular activities: 193 of them belong to science clubs and most of these are affiliated with Science Clubs of America.

Through an arrangement with the State Academies of Science 10 states are conducting state Science Talent Searches concurrently with the national contest. In these 10 states all entries in the national Science Talent Search will be turned over to state judging committees. From these they will choose state winners and award scholarships to various state colleges and universities. Cooperating states are: Alabama, Georgia, Illinois, Indiana, Iowa, Louisiana, Mississippi, South Carolina, Tennessee and Virginia.

The Science Talent Search is conducted by Science Clubs of America, administered by Science Service. The Search is made financially possible by the Westinghouse Educational Foundation, an organization endowed by the Westinghouse Electric Corporation for the purpose of promoting education and science.

In Arizona two students got honorable mention; in California, nine; Connecticut, three; District of Columbia, one; Florida, eight; Idaho, one; Illinois, 13; Indiana, two; Iowa, one; Kansas, six; Louisiana, two; Massachusetts, five; Michigan, four; Minnesota, four; Mississippi, two; Missouri, eight; Montana, two; Nebraska, three; New Jersey, 11; New Mexico, two; New York, 90; North Carolina, two; Ohio, 20; Oklahoma, two; Oregon, four; Pennsylvania, 21; Rhode Island, one; Tennessee, four; Texas, one; Vermont, one; Virginia, four; Washington, three; West Virginia, six and Wisconsin, 12.

Science News Letter, February 8, 1947

ASTRONOMY

Meteors Are Chief Source Of Facts About Upper Air

➤ METEORS are our chief source of knowledge about the upper air. The tiny dust particles from interplanetary space become luminous as they plunge into the earth's atmosphere and are heated by friction. Temperatures and pressures of the atmosphere 55 to 80 miles above the earth are discovered through studying the motions of meteors, according to Dr. Fred Whipple of Harvard Observatory.

Science News Letter, February 8, 1947

FLOATING CRANE—The largest self-propelled floating crane ever built is being readied by the Navy for Pacific waters. It is a jib-type of level-luffing construction. Its speed is 5.8 knots forward and 4.6 knots astern, and it can lift 350 tons 114 feet from its center of rotation. Official U. S. Navy photograph.

MEDICINE

Value of Streptomycin as TB Halt to Be Studied

➤ WHETHER streptomycin will become effective treatment for tuberculosis may soon be known.

The knowledge is expected to come through the newly created tuberculosis therapy study section in the research grants division of the U. S. Public Health Service's National Institute of Health.

The value of other TB fighting chemicals and antibiotics will also be studied.

The purpose of the new set-up is to stimulate research in a field where it is urgently needed, Surgeon General Thomas Parran stated in announcing the section.

Dr. H. Stuart Willis of Northville, Mich., has been loaned by the National Tuberculosis Association on a part-time basis to serve as chairman of the new section. He is interim chairman of the tuberculosis association's committee on medical research.

Science News Letter, February 8, 1947

BACTERIOLOGY

Germ Resistance to Penicillin Is Studied

➤ GERMS that do not cause disease are able to become resistant to the action of penicillin, just as disease germs are, and it is quite likely that they acquire this resistance in much the same way. This has been found out by a 'teen-age scientist, Leon Cooper, 16, senior at the Bronx High School of Science, New York, and one of the 40 Science Talent Search winners, in an independent research project on which he is still working.

Mr. Cooper used as his microscopic guinea pigs the common soil-dwelling organism known as *Bacillus subtilis*, already known to be sensitive to the action of penicillin. By growing cultures of it in penicillin solutions of graded strengths, he was able to produce several strains more resistant to the drug's action than the original one.

One of the ways in which some bacteria are able to survive in the presence of penicillin is by producing an enzyme that destroys it, called penicillinase. Mr. Cooper is testing his resistant strains by filtering out the liquid in which they grow, and comparing its action with that of liquid filtered from tubes of non-resistant cultures. He is also making filtrates from cultures of various ages, to find out at what stage of growth the penicillinase is produced most rapidly.

Science News Letter, February 8, 1947

PLANT PHYSIOLOGY

Changes in Plant Cells Induced by Acenaphthene

➤ CHANGES in plant cells, similar to those induced by colchicine, have been made with the vapor of acenaphthene by Arthur P. Mattuck, 16, a senior in Midwood High School, Brooklyn, N. Y. He reports them in an essay submitted in connection with the Sixth Annual Science Talent Search, conducted by Science Clubs of America under the sponsorship of Science Service.

The plant used in his experiments was the common low-growing, ornamental portulaca, often called flowering moss or rock rose. He treated it in two ways: by putting a budding branch into a short, wide test-tube coated inside with acenaphthene crystals, and by strewing seed on a blotter above some of the crystals in a covered dish.

By varying the lengths of exposure, he found the time intervals that would produce results without killing the buds or seeds outright. Best time for the buds seems to be between 12 and 15 hours; for the seeds, three days or less.

Pollen grains from flowers produced by the treated buds showed abnormal structures in their protoplasm. Mr. Mattuck fertilized other flowers with this pollen, and saved the resulting seed. As soon as he is able to plant them he will grow the new, and presumably changed, portulacas, to observe the treatment's effects.

Science News Letter, February 8, 1947

ORNITHOLOGY

Crowded Living Causes Birds to Move Elsewhere

➤ SOME BIRDS show a migration behavior suggesting that of some human communities in the past: they build up a greater population than the home territory can support, then burst out in a massive migration wave.

This population-pressure theory is offered as tentative explanation for the appearance of swarms of dovekies, small sea-birds of the auk family, far south of their normal winter range, by Martin Karplus, 16-year-old Newton High School senior of Newtonville, Mass. The theory is put forward in an essay submitted in connection with the Sixth Annual Science Talent Search, in which he is one of 40 successful contestants.

More local movements of the dovekie, along with two other species of sea-birds of the same family, Brunnich's murre and the razor-billed auk, may be correlated with shifting of immense swarms of minute sea plants and animals, which are the ultimate source of food for these birds.

Food supply is again the answer to the riddle of the restricted range of a fourth sea-bird, the black guillemot, in Mr. Karplus' opinion. This species is found only in the neighborhood of rocky coasts primarily because the food it depends on is found only in such places.

This young ornithologist, whose work is already appearing regularly in scientific publications, is among 40 leading high school seniors from all over the country who will attend the Science Talent Institute in Washington, D. C., Feb. 28 through March 4.

Science News Letter, February 8, 1947

IN SCIEN

PHYSICS

Magnetized Wire Records To Give Better Music

➤ BETTER MUSIC from magnetized wire records, whether in homes or theaters, will result from a new testing instrument that makes a continuous picture on a lighted screen of the magnetic properties of the wire as it is passed through the device.

The new instrument, called a "cathode ray oscilloscope hysteresis loop tracer," can also be used to test the magnetic properties of alloys at each stage in the manufacture into wire. The device, and methods of use, were revealed to the American Institute of Electrical Engineers by D. E. Wiegand and W. W. Hansen of The Armour Research Foundation, Illinois School of Technology.

The equipment includes a 35-pound exciting coil with pick-up coil at its center, an amplifier and integrating circuit, and a cathode ray oscillograph. It operates on power-line frequency without the use of oscillators or motor power, and was described as rugged and simple to operate.

Science News Letter, February 8, 1947

ENTOMOLOGY

HET Kills Insects Resistant to DDT

➤ MEET HET, newest terror to bugs. U. S. Department of Agriculture entomologists state that it seems well suited for combating red spider and red mites, two plant-damaging pests that survive DDT attacks and increase enormously when DDT wipes out competing insects. Combination of the two looks good for clean-up purposes. University of Wisconsin tests show that HET is also effective against aphids on cabbage and potato crops.

HET, which is hexaethyl tetraphosphate when spelled out, is a German chemical invention, which does not have the persistent, long-lasting protective effect that DDT gives. Further tests are planned for the coming crop season, but it will not be available for general use this year.

Science News Letter, February 8, 1947

E FIELDS

PHYSICS

Nature's Snow Is Less Pure than Man-Made Snow

➤ THE "DRIVEN SNOW," whose purity is so often mentioned, contains more impurities than the artificial snow made in General Electric laboratories by Vincent J. Schaefer.

Natural snowflakes contain microscopic foreign particles as nuclei; the artificial snowflake has a microscopic speck of ice instead. Natural snow gathers additional impurities as it falls through the atmosphere; the artificial stuff remains in its container and can gather no dust. However, natural snow is relatively pure; impurities in an average snowflake, according to Mr. Schaefer, amount to less than one billionth part of the flake under most cconditions. (*See SNL,* Nov. 23, 1946.)

Science News Letter, February 8, 1947

GEOPHYSICS

Doodlebug Goes to Antarctic To Reveal Mineral Deposits

➤ THE FAMED airborne magnetometer, or doodlebug, that located submerged enemy U-boats during the war, has now gone to the Antarctic to help reveal the mineral secrets of the South Polar region, the American Institute of Electrical Engineers was told.

Improved instruments of this type will be flown over Antarctic ice-covered areas by flying explorers of the Navy's expedition under the technical direction of Rear Adm. Richard E. Byrd. The instruments are in charge of J. R. Balsley, Jr., of the U. S. Geological Survey, who will conduct the aerial magnetic survey in an attempt to locate oil and other needed minerals.

This super-sensitive geophysical exploration device was demonstrated by engineers of the Naval Ordnance Laboratory and Bell Telephone Laboratories. The same type of instrument has already been used in making magnetic surveys in parts of the United States and in Alaska. The instrument measures variations in the magnetic field of the earth as the detector is flown over it.

Science News Letter, February 8, 1947

ENGINEERING

Current-Collector Removes Blue Sparks from Power Line

➤ NO VISIBLE blue sparks will follow the contact between power line and locomotive trolley on electrified railroads with a new current-collector described to the American Institute of Electrical Engineers by B. F. Langer of Westinghouse Electric Corporation. The practical value of the device is that with it higher speeds are possible than with the present contact shoe.

These shoes, which ride along the electrified overhead wire on a diamond-shaped framework above the engine to pick up the current, now cause considerable trouble at speeds above 70 miles an hour. They act like miniature airplane wings, Mr. Langer stated. They flutter against the wire, thus threatening to break the circuit momentarily and creating the familiar blue light flashes.

The new shoes reduce this difficulty by means of slots cut in them, and by means of redesigned springs, practically frictionless, that keep the shoe in constant contact with the wire. The material used is thicker, but no heavier than present materials, thus giving greater wearing depth and longer life.

In actual tests on the road, there is no evidence of shoe-flutter at speeds up to the highest commonly used, and no visible arcing except at switches and cross-overs.

Science News Letter, February 8, 1947

AGRONOMY

Radioactive Phosphorus Aids Study of Soil Needs

➤ RADIOACTIVE phosphorus is now being produced at Oak Ridge in sufficient quantities to permit relatively large-scale use in field tests on the fertilizer need of plants. Such tests are already under way, supported by funds supplied by more than a score of fertilizer manufacturers, Maurice H. Lockwood, president of the National Fertilizer Association, stated.

The radioactive material is thoroughly blended into ordinary superphosphate fertilizer, which is then applied to the soil in experimental field plots and in greenhouses. Where the fertilizer goes, and how fast it gets there, can be determined by using Geiger counters on the growing plants.

One of the chief objectives of the research is to find out, if possible, why so much phosphate gets lost. On an average, only about one-fourth of the phosphate put on the soil as fertilizer is taken up by the plants; the rest is dissipated in various ways. The scientists hope eventually to raise the efficiency of phosphorus utilization.

The work is being done under the general direction of Dr. Ralph W. Cummings of the North Carolina Agricultural Experiment Station at Raleigh. Tests are also being conducted at the New York State Experiment Station at Ithaca and at the great proving-ground of the U. S. Department of Agriculture at Beltsville, Md.

Science News Letter, February 8, 1947

MEDICINE

Bone Graft, Steel Plate Bridge Gap Between Breaks

➤ A BONE GRAFT and a stainless steel plate are used to bridge the gap between bone fragments in one of the newest methods of healing breaks of long bones of the body that fail to unite, Drs. G. Mosser Taylor and Malcolm B. Downs of Los Angeles reported at the meeting of the American Academy of Orthopaedic Surgeons.

The bone graft is placed on one side and the steel plate on the other. They are held together by stainless steel screws so that the fragments are clamped as in a vise.

This allows for a high degree of stability or fixity in all planes and the holding power is well maintained for the time required for new bone to be formed.

"When bone is detached from its blood supply it becomes inert or lifeless," Dr. Taylor stated. "The minerals—calcium and phosphorus—are not in motion as in living bone in which blood and lymph are circulating through it. It thus maintains its normal density while living injured bone around it wastes away due to the lack of use. Screws passed through the plate and the fragments of the ununited bone and anchored into this transplanted bone graft are able to hold longer than if anchored from the graft into the soft bones of fragments themselves.

"This method has been used in non-unions, some of many years' standing, in all the long bones and at different levels. It has proven very successful. Relatively few complications or failures have resulted."

Science News Letter, February 8, 1947

PHYSICS

Edison's Genius Lives On

The man who "lighted the world" was born 100 years ago. Thomas A. Edison laid foundations for modern scientific research.

See Front Cover

By RON ROSS

➤ THE WHOLE civilized world will pause Feb. 11 to celebrate the birthday of Thomas Alva Edison. Although Edison died in 1931, his discoveries and inventions are still providing, in an atomic age, new comforts and conveniences to millions throughout the world.

Born in Milan, Ohio, Feb. 11, 1847, Thomas Alva Edison "lighted the world" with incandescent lamps, reproduced voices and sounds with the phonograph, pioneered in motion pictures and radio, and achieved countless miracles of invention for science, industry and people in his lifetime.

Today, many of the achievements of science—weapons for victory in World War II, new methods of better communication and greater enjoyment, devices for industrial triumph and human progress—are being built on the foundations laid by the man whose birthday will be honored next week.

Future Conquests

With $2,000,000,000 and a world of skilled manpower to choose from, the development of the atomic bomb not only opened new roads to scientific conquest, but it set a pattern for future science and invention. Concentrated resources of men, equipment and funds seem destined to mark the future attacks of man on the secrets of nature. Government, industry and educational institutions will back the suggestions of great minds with facilities undreamed of even a decade ago.

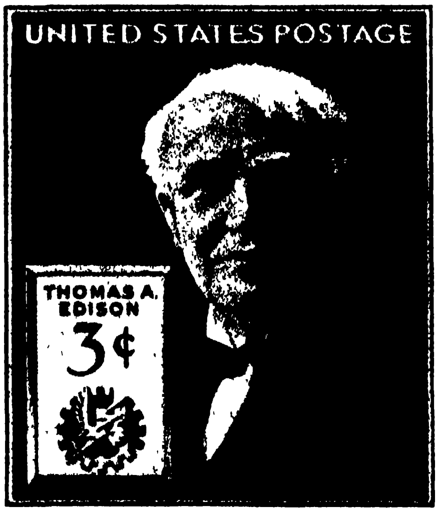
Against this picture, the figure of Edison, alone or with a few assistants in his laboratory, financing new experiments with the profits from previous inventions, will seem even more miraculous to future generations. What Edison might have done with a Manhattan District is pure speculation, but the great laboratories now planned throughout the world will be hard-pressed to equal the contributions of Edison's solitary genius.

During his life and since his death in 1931, Edison has been best known and most honored for the incandescent lamp which has lighted homes, businesses and most of civilization since its invention in 1879. Next in fame is probably the phonograph, produced when the inventor was 30 and probably his favorite invention. A less well-known experiment by Edison, which the inventor himself made little use of, may loom more important to historians of science in the future than either the lamp or phonograph.

In 1883, Thomas Edison put a cold piece of metal opposite the metal wire filament inside an electric light bulb. Electrons flowing along the wire created an electrical current. The filament, heated by the flow of electric current through it, emitted electrons and a minute electric current flowed along an external wire connecting the plate and filament. Edison showed that this current would always flow in the same direction. The discovery became known as the "Edison effect."

The inventor did not use this phenomenon, but 21 years later the British physicist, Sir J. Ambrose Fleming, utilized Edison's clue to produce the first simple detector tube for radio reception, the father of the modern vacuum tube used in your radio. When Dr. Lee De Forest, in 1906, learned to control the flow of electrons from the plate to the filament, the electronic tube and modern electronics were born.

From the discovery of the "Edison effect," scientists in World War II developed radar and other electronic devices now being turned to important peacetime uses. Electronics, founded on Edison's experiment of more than 60 years ago, may hold more important scientific advances than even the incandescent lamp.



COMMEMORATION — Purple in color, this postage stamp will be issued in Milan, Ohio, on Feb. 11 as part of the Edison centennial celebration.

Inventive Genius

The story of Edison is one of inventive genius unadorned with the dramatic touches of some great men of science and industry. He was not born in a log cabin and his early, varied business enterprises were not inspired by poverty. He did not labor for long years without fruitful achievement nor aid mankind with his achievements without receiving recognition in his lifetime. A successful inventor at the age of 23, Edison moved on to greater discoveries, and unprecedented honors recognized his work.

His first invention failed, but political science rather than natural science was to blame. First of many patents granted Edison was one in 1869 for an electric vote recorder for the U. S. House of Representatives. The device, similar to many now used by legislative bodies, worked too well to suit a committee from the House, because it would have put an end to filibustering on votes.

The next year the young inventor devised a stock ticker. For his improvements and inventions simplifying the transmitting devices of the stock exchange, he expected to receive at least $3,000. Instead, he was offered $40,000.

With this money, as with the fortunes he later gained from his work, he turned to new experiments and inventions. A mere list of the more than 1,000 inventions made by Edison, though imposing, tells only part of the story of his accomplishments. Machines for multiple telegraph transmission, the electric pen and the mimeograph, the microphone and the megaphone rank only below the

EDISON EXPERIMENT—Junior scientists use a piece of chalk, a dry cell battery and a glass of water to learn about reducing friction with an electric current.

lamp and phonograph. The latter was so revolutionary that never before Edison developed his phonograph had the idea for an apparatus to reproduce the human voice been put into a patent application.

Apart from the actual inventions by the man born 100 years ago lie pioneer work in motion pictures, the vacuum tube of radio and electronics, and important developments in the telephone transmitter, telegraphy and the perfecting of some of his own original inventions.

Many myths surround the life of Edison. His deafness, credited by the inventor with aiding his work, is sometimes said to have come when an irate train conductor boxed his ears after the boy had set fire to a train in an improvised chemical laboratory in an empty car. Actually the injury occurred when he attempted to mount a moving train and was pulled aboard by his ears.

His long hours of work with only four to six hours of sleep a night amazed his friends. Asked about his philosophy of life a few years before his death, Edison said it was, "Work- bringing out the secrets of nature and applying them for the happiness of man." And he added, "Looking on the bright side of everything." Edison was caught by a photographer in a rare moment of relaxation shortly before his death and the picture is shown on the cover of this SCIENCE NEWS LETTER.

One of his last projects helped to answer today's demand for scientists and the need for encouraging young scientists. In 1929, Edison brought 49 promising youths to his famous laboratory. They were given tests, with a scholarship prize to the winner. Today elaborate projects, such as the nation-wide Science Talent Search for the Westinghouse Science Scholarships, are conducted among teen-age scientists.

Modern science does not leave young men with the talents of Edison to pursue their own course without the support of the best collaborators and equipment known. Many minds are now at work building on foundations Thomas Alva Edison helped to erect.

Science News Letter, February 8, 1947

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CHEMISTRY

Process Reduces Loss Of Element Selenium

➤ REDUCING WASTE of the rather costly element selenium when it is added to molten glass for the purpose of obtaining a tinted product, is the objective of patent 2,414,413, issued to A. E. Pavlish and C. R. Austin of Columbus, Ohio, assignors to the Battelle Memorial Institute. Adding an oxidizable silicon compound along with the selenium prevents most of the loss through volatilization that occurs when selenium is put in alone.

Science News Letter, February 8, 1947

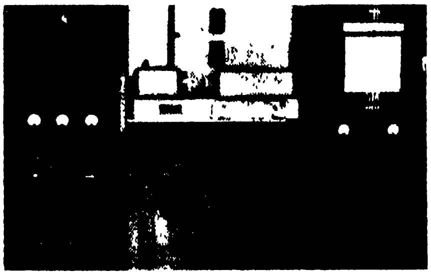

Photo Courtesy Standard Oil Dev. Co.

INFRA-RED SPECTRA

Recorded By Speedomax G

The equipment shown above, in an oil company's research lab, makes many analyses which would be nearly impossible by other means. The recording instrument is a Speedomax Type G, which follows quickly and accurately the output of a Perkin-Elmer spectrometer. Its speed and sensitivity are ample for most spectrometry uses, and input filter design keeps pick-up troubles small. For details about Speedomax G, ask for Catalog ND-46(1).

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PHYSICS

Making Edison Models

Junior Scientists can make working models of Edison's first electric fuse and of his first phonograph. Models make interesting exhibits for Edison Centennial.

In honor of Thomas A. Edison's centennial birthday, the SCIENCE NEWS LETTER *presents plans, drawn up by Joseph H. Kraus, for models of Edison's contributions to science. The story of the great scientist who gave light to the world is told on the preceding pages.*

Model of First Phonograph Made of Cardboard, Wood

➤ A MODEL of the first phonograph can be made by the Junior Scientists from wood, cardboard and a few odd parts. Or a machine that will reproduce the voice more exactly may be built almost entirely of metal. Either of these replicas will be ideal to exhibit in connection with the Edison Centennial celebration that will take place throughout the country this month.

The original phonograph, that worked the first time Thomas A. Edison tried it, was rotated by hand. Instead of recording sound on a flat disk such as the phonograph records in use today, Edison's voice was picked up on a sheet of tinfoil wrapped around a cylinder.

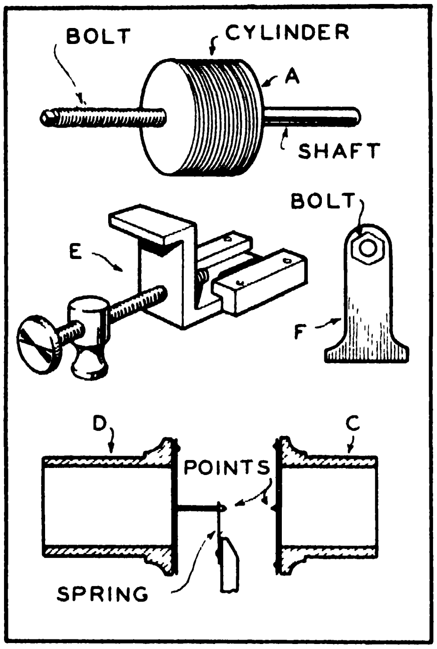
The diaphragm in the trumpet vibrated when words were spoken into it. A rounded point attached to the diaphragm formed on the rotating silver foil a series of indentations characteristic of the sound waves. Sound was reproduced by again rotating the cylinder and running the needle-like point of the reproducer in the grooves. The indentations on the record caused the needle and its attached diaphragm to vibrate in such a manner that the sounds were recreated.

The diagrams on this page brief the construction of the first phonograph. The sketches show the different parts in detail. If you want to build an article that will be used primarily for exhibit, you can make the model entirely from wood and cardboard.

The device consists essentially of a cylinder, A, a little less than four inches in diameter and slightly more than three and three-eighths inches long. This is mounted on a square-thread screw, almost three-quarters of an inch in diameter, with ten threads to the inch. The overall length of the shaft is just under a foot.

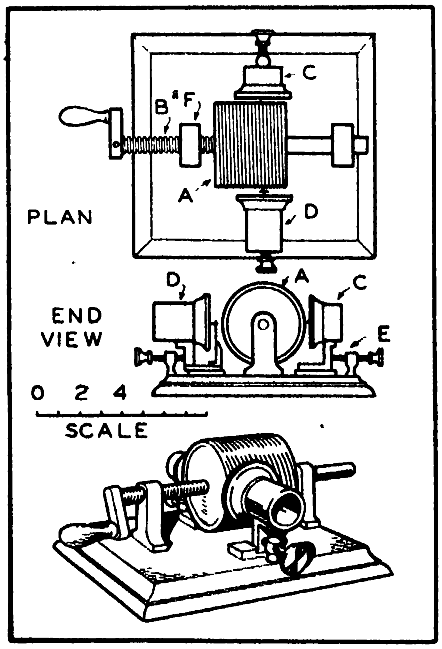
In the original model, the cylinder is of brass with brass ends; the screw and shaft are of one piece of steel. The Junior Scientist, wishing to make only a crude model, may substitute a cardboard salt container for the cylinder, and use a five-eighths inch bolt, B, for the more precision-like job made by Edison.

The nut of the bolt may be fitted into a wooden support, F. The shaft is supported by another support with a hole cut through at the proper height to allow the cylinder to turn freely. In the original, these supports were made of steel properly threaded and fastened to a metal base plate, but wood makes an excellent substitute for your model.



The brass cylinder has spiral grooves cut in it to correspond with the threads of the bolt. The experimenter can cut similar grooves in the cardboard box. A sharp knife or the point of a phonograph needle can be used to scratch the surface, then make deeper the marks by going over the scratches several times.

The recorder, C, into which a person speaks, also can be made of cardboard. In the original model, it is of brass and measures a trifle over two inches in diameter at the wide end, about one and three-quarters inches in diameter at the narrow end. Its overall length is slightly less than one and a half inches.



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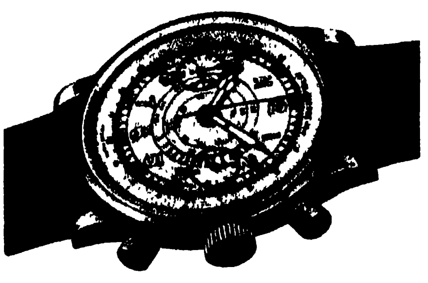

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A cardboard pill box or piece of mailing tube may be used to build this recorder. The flaring end can be built up with wood or putty, then fashioned to shape.

The first recorder has a steel diaphragm shellacked across the wide end, to the center of which is attached a dull or rounded phonograph needle that will form grooves without tearing the foil. The diaphragm for your model can be made from a sheet of glassine or wax paper. Shellac this and attach your phonograph needle to the center with airplane cement. This will record the vibrations on the tinfoil.

Mount the entire unit on a bracket with a screw adjustment to allow it to slide back and forth. The screw may be a brass binding post from an old, discarded radio set.

The reproducer, D, through which your voice will issue, also may be built of cardboard. The wide end is a little over two and a half inches in diameter and the narrow end a bit less than one and three-quarter inches. Its overall length is a fraction less than two inches. The reproducer is mounted in the same way as the recorder.

The diaphragm in the reproducer is of mica, shellacked in place and fitted with a long point attached to a light, flat spring. The diaphragm in the model, however, may be made from glassine or wax paper. A dull phonograph needle should be attached to the center. The adjustment, E, to which the recorder and reproducer are fastened, may be made from wood or heavy cardboard. In the original these parts were of brass.

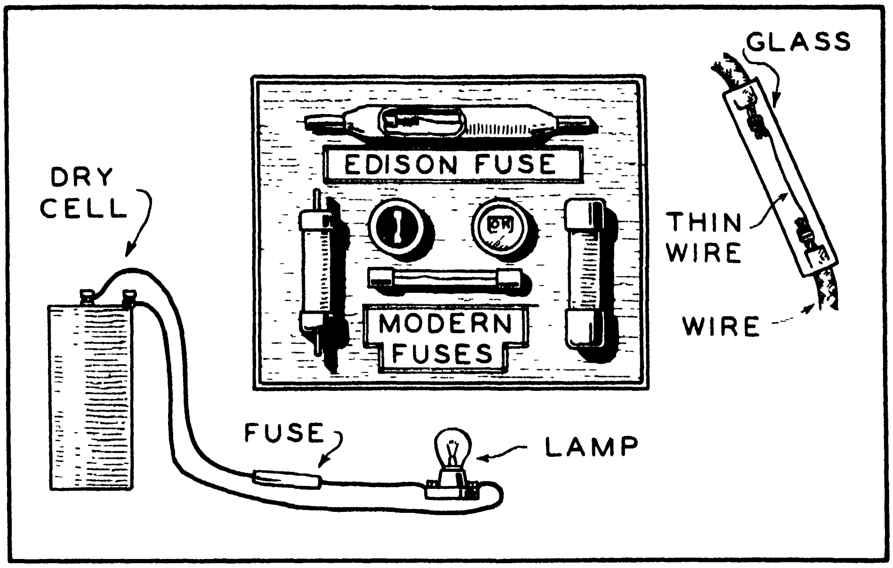
The crank is not quite an inch wide, and two and one-eighth inches long. The handle is one inch in diameter, and two and three-eighths inches long. All other dimensions can be obtained quite well from the accompanying diagram.

If you make the model entirely from metal, with little difficulty you can reproduce sound by using the method which Edison employed and which became the subject of his patent granted in December, 1877.

A thin metal foil is placed around the cylinder and shellacked lightly. The recorder is adjusted so that it will give sufficient pressure to indent but not tear the metal foil.

Sound vibrations, directed into the funnel-shaped horn, are transmitted through the diaphragm to the embossing needle. This indents vertical grooves in the foil surface as the cylinder is turned. When the reproducer is adjusted so that its needle rests lightly upon the indentations, these vibrations are transmitted to the reproducer which, as the crank handle is turned, makes these vibrations audible to the human ear.

In a cardboard and wood reproduction, it is best to paint the parts so that they resemble the original metals. If all parts have been accurately centered and are perfectly true, you may be successful in reproducing sound; otherwise, the cardboard item can be used as a dummy exhibit not intended to be operated.



Model of First Fuse Shows How Modern Varieties Work

➤ A WORKING model of Thomas A. Edison's first electric fuse, similar to many in use today, can be made easily by Junior Scientists. An interesting display would include such a model contrasted with the many different types of modern fuses plus any real old fuses you can collect.

Edison's first fuse was patented on May 4, 1880, under the name of "Safety Conductor for Electric-Lights." The patent states that such a fuse should be placed in the circuit of each lamp or other current-carrying device.

The first model employed a small conductor that would melt away whenever the branch circuit was overloaded. In an attempt to protect furniture and carpets from the few drops of molten metal left by the hot wire, Edison encased the wire in a jacket or shell of non-conducting materials. The tensile strength of the non-conducting shell was great enough to keep the wire from parting.

In many respects modern cartridge fuses, particularly those on automobiles, are similar to the old Edison fuse. Here the small fuse is enclosed in a glass envelope. The strain on the wire is ab-

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sorbed by a surrounding insulation-lined metal jacket.

The Junior Scientist can demonstrate on an ordinary dry cell how the first fuse worked. To make your model fuse, you will need a piece of flexible copper wire similar to the wire that connects your floor lamps or electrical equipment to the outlets. Cut off a three-inch length of this wire and bare it. Now separate the individual strands of copper. Any of these strands can carry the current in your fuse.

Bare two ends of regular flexible wire for a distance of a half inch or so, and connect the wires by twisting one of the thin strands of copper across them. This will leave the two ends of flexible wire about an inch apart. Now slide a glass tube around the wire as illustrated in the diagram. This completes your "fuse."

Connect this fuse to a dry cell and lamp in series as shown. The lamp should be of the small one-cell flashlight varieties which you can obtain from the 5- and 10-cent store. When everything is in order, the lamp will light.

"Short" your circuit by holding the open blades of an old pair of scissors against the two terminals of the lamp socket. In this way you cut the lamp out of the circuit. The current now flows from one side of the cell to the other via the wire, scissors and fuse.

This load is more than the thin piece of copper wire in the glass tube can carry. The wire immediately gets over heated, melts and breaks, thus cutting off the current and protecting your power supply. If you care to look, you will find tiny particles of copper in the glass tube.

Details regarding the construction of the original fuse probably have been lost for all time. Exactly what alloy of low melting point was used for the wire and what materials were employed in the surrounding shell of the first fuse are not definitely known.

The patent specifications merely suggest that the shell was composed of two halves, made slightly tapering at the ends and with a slight inward flange firmly to grasp the insulation surrounding the wire. Hoops or bands were to be slipped over the two halves of the fuse to hold them in place and thus relieve the fuse wire of all strain.

The basic design of this safety conductor is in use today. Although modifications have been made during the intervening years, it would appear that no better or cheaper method of preventing overloads and short-circuits has been developed since Edison patented his idea.

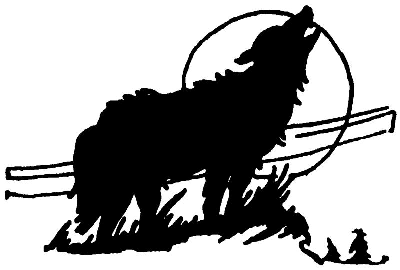
Screw-base fuses bought today are similar to the earliest fuses. Employing the same principle, they are merely made from porcelain, glass or plastic instead of the wood used in the earliest fuses.

Science News Letter, February 8, 1947

ZOOLOGY

NATURE RAMBLINGS

by Frank Thone



Befriended by His Foes

➤ COYOTES, zoologists tell us, are not only present over most of their pre-settlement range but have actually extended it, even appearing on the outskirts of rather large cities. Despite the lack of welcome they receive from civilized man, these little wolves of the prairie find it profitable to hang around his settlements and ranches, where they can snap up poultry, lambs and shoats, and feast on carrion and garbage.

There is a certain element of justice in this, Wilfrid S. Bronson, artist-naturalist, points out in his just-published book, titled simply "Coyotes", which he wrote especially for small children. (*Harcourt, Brace & Co.*, $1.75.) When the white man pushed his frontier out into the West, he not only killed all the coyotes he could shoot, trap and poison, but he destroyed a major part of the natural food of those who were crafty and hardy enough to survive direct attack, by killing or driving away most of the game and plowing up the sod where swarming rodents nested. So if a coyote steals a few hens he is only getting even for the loss of an equivalent weight in prairie-dogs, field-mice and grasshoppers.

There is one factor in the spread of the coyote east of the Mississippi during recent decades that is often overlooked. The coyote is naturally an animal of the plains and prairies; he isn't at home in the timber. When the white man came, most of the East was heavily forested. Settlers cut and burned the trees to make way for farms. This huge-scale clearing, which had much to do with the disappearance of the timber-wolf, meant simply an extension of the prairies for the coyote. So he has been moving in. And if the farmer supplies him with occasional poultry and piglets, so much the easier is life.

The coyote is by no means the unmitigated thief and general pest that he is sometimes pictured by exasperated victims of his raids. His principal diet still consists of small rodents, which in the aggregate devour a great deal more of the farmer's or rancher's substance than a few furtive predators are likely to get away with. Also, by cleaning up the carcasses of animals dead of accident, disease or exposure, the coyote performs a direct service. Moreover, he is musical. Many a rancher, who plots his destruction by day, will admit by campfire-light that he "kinda likes to hear the old cuss howl."

Science News Letter, February 8, 1947

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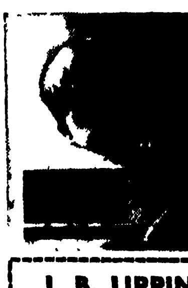

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BEAUTY PLUS—The Key to Beauty, Health, and Charm—Mary MacFadyen, M. D.—*Emerson*—272 p., illus., $2.49. A popular discussion of health and beauty, leading to personality improvement.

A CENTURY OF FARMING IN IOWA—1846-1946—Iowa State College Staff Members —*Iowa State College Press,* 358 p, illus., $5. Published on the 100th Anniversary of Iowa's Statehood, this history of agricultural practices shows its development under the application of increasingly knowledgeable scientific principles.

DRAFTING FOR ELECTRONICS—L. F. B. Carini—*McGraw-Hill,* 211 p., $2.50. A careful development of the subject from fundamental techniques in drafting to their final application.

EXPLOSION AND COMBUSTION PROCESSES IN GASES—Wilhelm Jost; Translated by Huber C. Croft—*McGraw-Hill,* 620 p., $7.50. Translation of the classic German work on jet propulsion first published in 1935.

FOOD & HEALTH—Henry C. Sherman—*Macmillan,* new ed. 290 p., $4. Advances in the improvement of food habits to create positive health and longer life. Completely rewritten.

GAS TURBINES AND JET PROPULSION FOR AIRCRAFT—G. Geoffrey Smith—*Aircraft Books, Inc.,* 256 p., illus., $5. This new enlarged edition should stimulate interest in the field of jet propulsion. The material is presented clearly for the engineer, the pilot and the layman.

INFORMATION PLEASE ALMANAC 1947—John Kieran—*Garden City,* 1014 p., $2. A compilation of well-indexed facts, comprising a history of the past year.

INORGANIC CHEMISTRY—W. Norton Jones —*Blakiston Co.,* 818 p., illus., $4.25. A textbook of first year college chemistry.

LABORATORY MANUAL FOR PRINCIPLES AND PROCESSES OF PHARMACY—Henry M. Burlage, Ed.—*McGraw-Hill.* 271 p., paper, $3. A variety of experiments and the optimum amount of work that should be offered the student pharmacist.

PACIFIC SCIENCE, A Quarterly Devoted to the Biological and Physical Sciences of the Pacific Region, Vol. 1, No. 1, Jan. 1947 —A. Grove Day, Ed.—*Univ. of Hawaii.* 62 p., illus., paper, $3 a year, single copies $1.

REPORT OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION AND FINANCIAL REPORT OF THE EXECUTIVE COMMITTEE OF THE BOARD OF REGENTS FOR THE YEAR ENDED June 30, 1946. *Govt. Printing Office,* 134 p., paper, 35 cents. Publ 3864.

SAUDI ARABIA: With an Account of the Development of Its Natural Resources—K S. Twitchell—*Princeton Univ. Press,* 192 p., illus., $2.50. The geography, resources, history and customs of this nation as it emerges into modern world economy.

SYSTEMATIC MOTION AND TIME STUDY—Marvin E. Mundel—*Prentice-Hall,* 232 p., illus., $4. The basic principles of work analysis and time study technique applied to various types of operations.

VITALIZED GENERAL SCIENCE—Barclay M. Newman—*College Entrance Book Co.,* 380 p., paper, illus., 75 cents. General science for high school students.

Science News Letter, February 8, 1947

WRITER

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PHYSICS

Radiant Heat De-Ices Windshields of Cars, Planes

➤ DE-ICING windshields, perennial winter problem in both aircraft and automobiles, is attempted in a new way, by direct radiant heat, in a device on which U. S. patent 2,414,520 has been granted to H. A. Greenwald of Hollywood, Calif. He has assigned his patent rights to the Lockheed Aircraft Corporation.

Blowing blasts of warm air up the inside of the glass panels of a windshield, or through a space between parallel panels, doesn't work very well in practice, the inventor points out, because glass is a rather poor conductor of heat. By directing infra-red radiation through the glass, from electro-thermal elements in trough-shaped reflectors, heat is applied immediately to the ice itself, readily thawing and loosening it.

The new device will work equally well with solid plate glass and with sandwich-constructed safety glass, it is claimed.

Science News Letter, February 8, 1947

CHEMISTRY

Long-Life Radioactive Iodine from Tellurium

➤ A NEW LONG-LIFE radioactive iodine has been produced by bombarding the chemical element tellurium. Instead of the relatively short existence of the usual radioiodine used in medical treatments, the new synthetic iodine is believed to have a half-life of either 10 or 400 years.

Iodine isotope 129, hitherto missing from accepted tables, was made by bombardment with hearts of heavy hydrogen or deuterons speeded to 14,500,000 electron-volts in the MIT cyclotron. Dr. Allen F. Reid, at Columbia University when the experiments were made, and Dr. Albert S. Keston of New York University, report their discovery in the *Physical Review.*

Science News Letter, February 8, 1947

Bats and whales are *mammals* in spite of the fact that one flies and the other swims.

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• New Machines and Gadgets •

SNOWPLOW for sidewalks is a jeep with a scraper blade attached in front, and a revolving snow broom behind. The sweeper broom is powered from the jeep's engine. The four-wheel drive of the vehicle enables it to climb curbs without difficulty.

Science News Letter, February 8, 1947

MIDGET FURNACE, a gas-burning unit about the size of a suitcase, burns the fuel in a sealed chamber with an air inlet and an exhaust vent through the house wall. This automatic noiseless heater, with electric spark ignition instead of a pilot light, uses any ordinary cooking gas.

Science News Letter, February 8, 1947

PIPE CLEANER is a rubber device that fits on the bowl of a pipe and over the opening of a water faucet, forcing water through the pipe and out the stem. The upper inside of this recently patented device is conical in shape and fits the faucet.

Science News Letter, February 8, 1947

BOARD PRY, for salvaging old lumber in razing buildings, has a fulcrum side arm that fits over a wall stud, and a lifting face that fits flat over the entire rear width of the board being removed. This flat face assures equal pressure when the operating lever is depressed and keeps the wood from breaking.

Science News Letter, February 8, 1947

STORAGE BAGS for clothing, blankets and household linens, are made of a special fabric woven of very fine glass fibers, then coated with a plastic resin. They will not shrink, stretch or rot, and protect garments against moisture, fire and dust. When their zipper fasteners are closed, no moths can get inside.

Science News Letter, February 8, 1947

WASHER and drier for automobiles, a mechanical arrangement for the commercial cleaning of cars, is claimed to wash, polish and dry a car a minute. Water is sprayed on revolving brushes that remove all exterior dirt, then air currents dry the car without leaving any streaks.

Science News Letter, February 8, 1947

SPARK-PLUG analyzer, an electronic instrument developed for Army Air Forces, provides a reliable method for testing airplane and automobile plugs. It indicates corona discharges, leakage, spark jumps and insulation losses by oscillographic methods, and can be operated by inexperienced persons.

Science News Letter, February 8, 1947

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 348. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

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Question Box

AGRONOMY

What is one of the chief objectives of the radioactive phosphorus tests on soil? p. 89

ASTRONOMY

What do meteors tell us about the upper air? p. 87.

What are most important questions facing Milky Way astronomers? p. 84.

BACTERIOLOGY

In what way are some germs able to live in the presence of penicillin? p. 88.

CHEMISTRY

What are the names of elements 43, 85, and 87? p. 83.

ENTOMOLOGY

What insects is HET especially effective against? p. 88.

GEOPHYSICS

Why has the doodlebug gone to Antarctica? p. 89.

MATHEMATICS

How fast can ENIAC calculate? p. 83.

MEDICINE

How large is the amount of iodine in voiders? p. 86.

How will the antibiotic just discovered be used? p. 85.

Why is germ resistance to streptomycin more important than to penicillin? p. 85.

ORNITHOLOGY

What do birds do to relieve crowded living conditions? p. 88.

PHYSICS

What was Edison's first invention? p. 90.

SOCIOLOGY

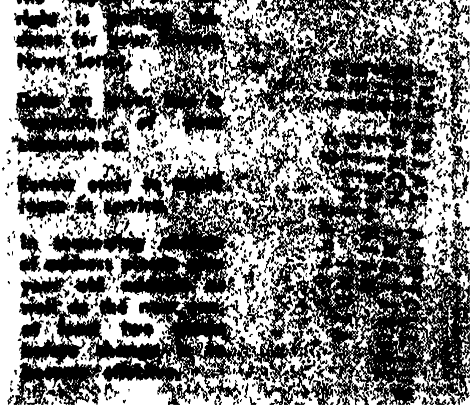
Do girls on farms or in large cities have better chances of marrying? p. 86.

Where should men and women go mate-hunting if they want to get married? p. 86.

ZOOLOGY

Why have coyotes extended their living range? p. 94.

Where published sources are used they are cited.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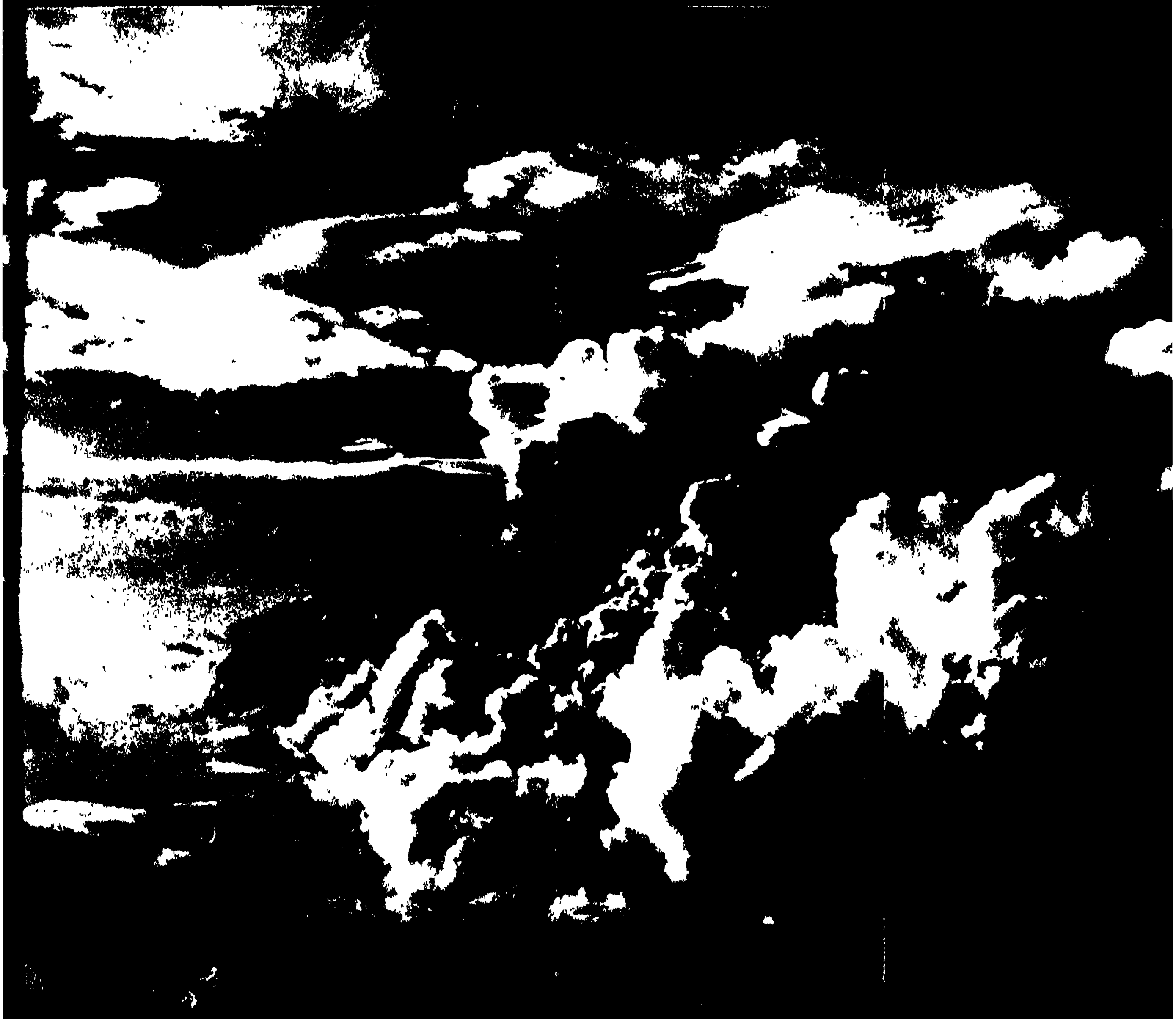
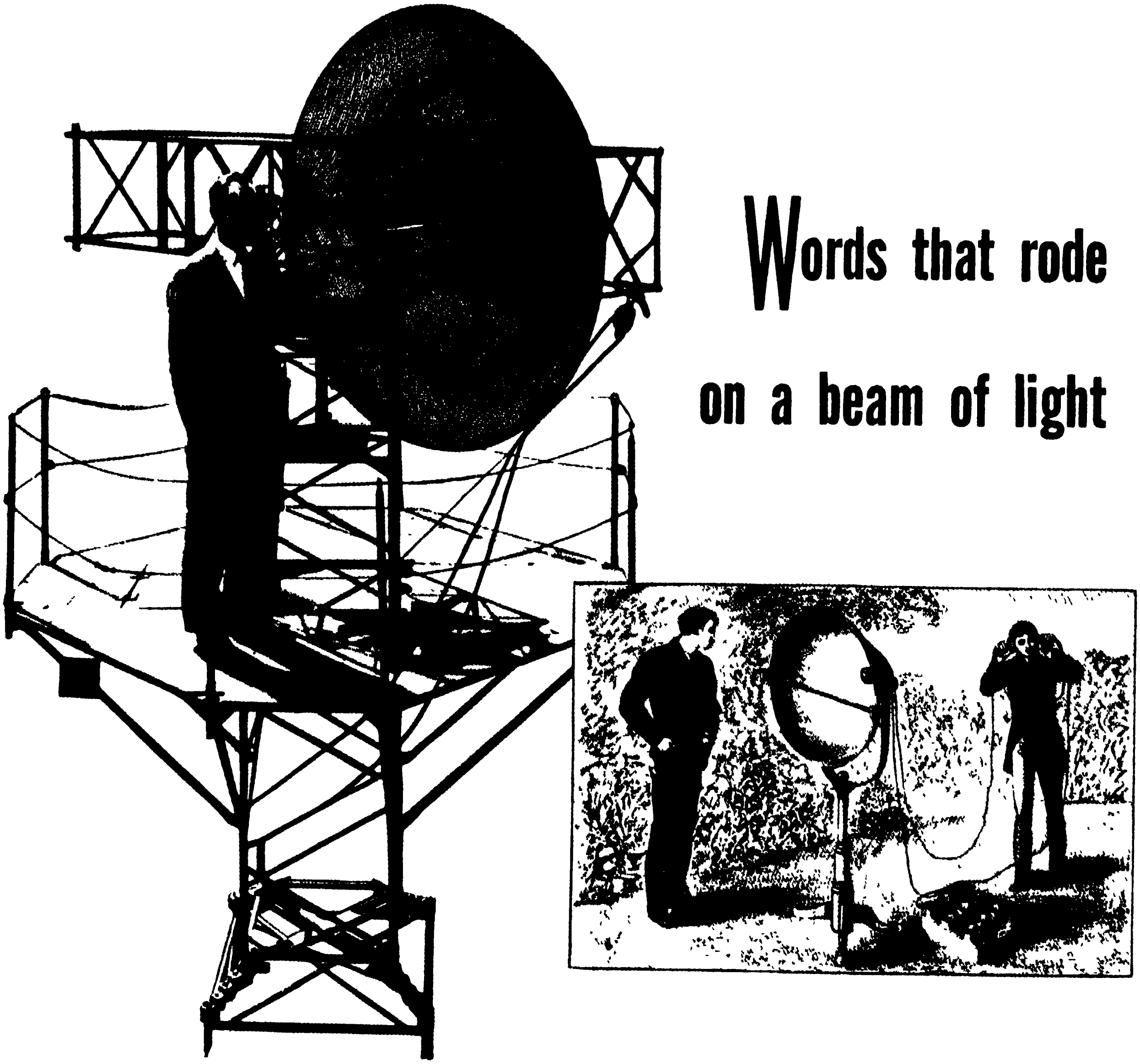


A SCIENCE SERVICE PUBLICATION

Words that rode on a beam of light



If Alexander Graham Bell could look at the microwave antenna in the illustration, how quickly his mind would go back to his own experiments, 67 years ago!

For in 1880 the inventor of the telephone had another new idea. Speech could be carried by electric wires, as Bell had demonstrated to the world. Could it be carried also by a *light beam?*

He got together apparatus—a telephone transmitter, a parabolic reflector, a selenium cell connected to handphones—and "threw" a voice across several hundred yards by waves of visible light, electromagnetic waves of high frequency.

Bell's early experiment with the parabolic antenna and the use of light beams as carriers was for many years only a scientific novelty. His idea was far ahead of its time.

Sixty years later communication by means of a beam of radiation was achieved in a new form—beamed microwave radio. It was developed by Bell Telephone Laboratories for military communication and found important use in the European theater. In the Bell System it is giving service between places on the mainland and nearby islands and soon such beams will be put to work in the radio relay.

In retrospect, Bell's experiment illustrates once again the inquiring spirit of the Bell System.

BELL TELEPHONE LABORATORIES

EXPLORING AND INVENTING, DEVISING AND PERFECTING FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE

MEDICINE

Streptomycin Checks TB

Streptomycin, available for everyone now, stops tuberculosis germs and gives cavities and ulcers a chance to heal. It is not a cure for the disease.

➤ FOR THE FIRST time in history, tuberculosis has met its chemical conqueror.

A chemical drug, streptomycin, checks the progress of the "white plague" in human beings.

A little group of sick veterans who would have died are alive today because they were treated with medicine's latest germ-fighter.

The doctors are frankly quite excited, in a quiet, conservative, restrained way. This seems to be the new TB weapon they had been hoping and striving for.

Because there are half a million Americans alone suffering with tuberculosis, what has happened should be the biggest world news of today.

The drug that is making this big news, streptomycin, like that other "miracle" drug, penicillin, comes from a microbe that is between a mold and a bacteria and lives in the soil. It is a kind of sister to penicillin. It was discovered three years ago after laborious searching by Dr. Selman A. Waksman and associates at Rutgers University and the New Jersey Agricultural Experiment Station.

Today, you can get streptomycin on your doctor's prescription at your drug store. When first discovered and for some time after, only tiny amounts were available and it was almost prohibitively expensive. Now enough to treat a TB patient can be bought for from five to 10 dollars per day. The patient gets the drug for from four to eight weeks.

Patients with lung tuberculosis, the most common kind of TB, often begin to get well quickly. Fever goes down within the first few weeks. The sometimes racking cough that produces dangerous, germ-laden material stops. The patient's appetite comes back, he feels much better and begins to regain weight. When he does cough, the material no longer has germs. X-ray pictures show how the cavities, or spots on the lungs, are healing.

These are among the good results doctors are now talking about openly. The streptomycin push against tuberculosis started secretly, two years ago, at the Mayo Clinic and Foundation. There Drs. H. Corwin Hinshaw and William H. Feldman started trials of it, first on guinea pigs, then on a few desperately sick TB patients in mental hospitals.

Now several thousand patients are getting the drug. More than 200 are veterans in VA hospitals around the country. Almost 50 were treated during the past year by Drs. Walsh McDermott and Carl Muschenheim of Cornell University Medical College and New York Hospital.

The same good results in some patients, and the same disappointments in others, are being reported from all these places.

The drug stops the germs on their rampage through the body, gives a chance for cavities and ulcers to heal and for the surgeon in some cases to help speed the healing. To the doctors, streptomycin is not a "cure" for TB, but a germ-stopper, or suppressive as they term it.

The disappointments come when the drug stops checking the germs because they have grown resistant to it. Then the patient who was on the way to getting well relapses and sometimes dies. This is the biggest problem doctors still have to lick. They have also to learn how much streptomycin is the right dose in each case, and how to prevent the dizziness, deafness and skin rashes that sometimes come from the drug.

Tuberculosis is not just one disease but many. It can attack bones, joints, the eyes, and any organ of the body. In some kinds of tuberculosis the drug helps more than in others. Doctors have barely started trying it in bone and joint TB. They frankly do not know yet what effect it will have. Many of the patients with this kind of tuberculosis are children who may be badly crippled by the disease. Streptomycin may save them from stiff hips, short legs, twisted spines. It is still too soon to say.

In bringing streptomycin through its first trials, private laboratories and clinics, the manufacturers, the National Tuberculosis Association and the American Trudeau Society, the Veterans Administration and the U. S. Public Health Service have all helped. Brains and money from these sources have gone into the common task of building what looks like the atom bomb for the war on tuberculosis. More of both are still needed.

Science News Letter, February 15, 1947

TB FIGHTERS—Scanning reports of human cases of tuberculosis checked by streptomycin are Dr. C. J. Van Slyke, medical director, U. S. Public Health Service and chief, research grants division, National Institute of Health; Dr. Walsh McDermott, Cornell Medical College; Dr. Paul A. Bunn, Veterans Administration tuberculosis fighter and Dr. H. Corwin Hinshaw, Mayo Clinic.

hundred million-volt deuterons (hearts of heavy hydrogen atoms) in the new big Berkeley cyclotron first operated a few months ago.

More powerful atomic particle accelerators are building now. In a few years man will match the cosmic rays and produce mesons at will. Scientists are using rockets to get nature's cosmic rays recorded 20 to 100 miles above the earth. Science is in the midst of one of the greatest explorations of all time.

Science News Letter, February 15, 1947

Calcium chloride is often used in the cement for making concrete building blocks; it gives high early strength.

SCIENCE NEWS LETTER

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RESEARCH LEADER—Dr. Selman A. Waksman, of Rutgers University and the New Jersey Agricultural Experiment Station, heads research on streptomycin, which he discovered.

PHYSICS

Cosmic Ray Exploration

Neutral meson plays important part in Dr. J. Robert Oppenheimer's latest cosmic ray theory. Short-lived, they split into rays that bombard the earth.

➤ THE SCIENTIST who put together the atom bomb has explained the way in which the most powerful projectiles man knows—cosmic rays—do their stuff.

An unappreciated sub-atomic particle, the neutral meson, plays a major role in the latest cosmic ray theory of Dr. J. Robert Oppenheimer of the University of California, former director of Los Alamos atomic bomb laboratory.

Neutral mesons live but a mere one ten-quadrillionth of a second after they are created by mysterious primary proton bombardment from outer space. Even so, they are responsible for the astounding showers and cascades of powerful radiation that continuously rain upon the earth, even penetrating your body as you read this.

Mesons, which may be positive, negative or neutral in electrical charge, sort of lurk in the nuclei or hearts of nitrogen atoms in the rare air in the upper reaches of the atmosphere. Along comes a ten billion-volt particle, a proton, from somewhere in the cosmic depths of the universe. It smacks the nitrogen atom's heart. Mesons by the many thousands fly out. Each neutral meson disintegrates into a pair of gamma rays, powerful X-radiation, that literally bombard the atmosphere below creating all sorts of effects there.

"I am glad this has nothing to do with atomic energy," said Dr. Oppenheimer. This is not a theoretical prelude to a new kind of atomic bomb, so far as can be seen now.

It may be more important than atomic energy. For it may explain the fundamental character of matter and energy. Science may be now making its "last great push" in exploring the realm of theoretical physics, mother science of the atomic bomb.

There is evidence, Dr. Oppenheimer told the American Physical Society, that the same laws that govern the ten billion-volt particles rule the ten quadrillion-volt particles of the even more powerful cosmic radiation. There was apprehension that new particles and new laws would be needed to explain what happens in these higher energy realms.

So far the most powerful particles accelerated by human control are the two

AERONAUTICS

Army XB-46 Has Four Jet-Propulsion Engines

➤ FOUR jet-propulsion engines in a single plane is something new for the U. S. Army Air Force, but that is the equipment of a new bomber undergoing ground tests by Consolidated Vultee Aircraft Corporation.

Its first air flight is a couple of months off. In general appearance the new plane, to be known as XB-46, is similar to ordinary craft with two engines in the wings on opposite sides of the fuselage, but without the visible propellers. Its long, slender body extends nearly 106 feet from nose to tail, and it has a wingspan of 113 feet.

Its four engines, General Electric gas turbines, are placed in pairs, each pair in a single housing space, or nacelle, one on each side of the body, and fitted into the wing construction with a minimum of bulge. Further details will not be revealed until a flight test is made.

Science News Letter, February 15, 1947

CHEMISTRY

Artificial Sillimanite Can Replace Kyanite

➤ A GERMAN artificial sillimanite, a substitute for the natural product with which Americans are familiar in certain automobile sparkplugs, was made during the war to use in place of the unobtainable Indian kyanite for refractories and electrical insulation purposes.

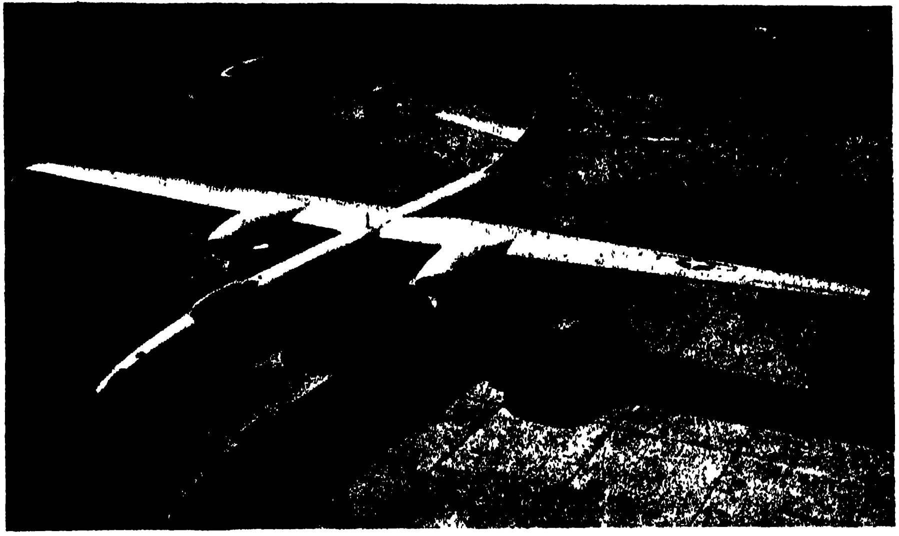
The German formula and process are now made available to American industry by the U. S. Department of Commerce.

Large quantities of domestic sillimanite and imported kyanite are used in America in refractories, electrical installations, sparkplugs and laboratory porcelain. Kyanite is used for heavy-duty refractories, and the demand for Indian kyanite will continue unless a domestic deposit is found of kyanite or sillimanite which contains recoverable material in grain sizes similar to the Indian product.

Sillimanite is an aluminum silicate. The German process of making the substitute requires, by weight, 60% of kaolin, 27% of aluminum hydroxide, 10% of fused alumina, and 3% feldspar.

Copies of the report, either in photostatic or microfilm form, from the Office of Technical Services, U. S. Department of Commerce, Washington, D. C., are available for $1.00 each.

Science News Letter, February 15, 1947



XB-46—This four-jet bomber is being built for the Army Air Forces by Consolidated Vultee Corporation.

MEDICINE

Hidden Infections Mystery

To control virus diseases it is necessary to know more about latent infections, states scientist. Present concepts about effects on patients are inadequate.

➤ VIRUS DISEASES cannot be adequately controlled until scientists have formulated a better understanding of latent, or hidden, infections, says Dr. Karl F. Meyer, noted University of California epidemiologist.

Dr. Meyer points out that there is actually little known about the latent process, which plays an important role in all virus diseases, including influenza, poliomyelitis, encephalitis and psittacosis.

Latent infections are classified by Dr. Meyer into three general categories: low order ones in which the victim is unaware of his condition and it cannot be diagnosed clinically; dormant conditions which precede serious illness; and those persisting in the body during recovery from serious illness.

In epidemics latent infections assume importance when carriers whose condition is not recognized act as a reservoir for transmission of the virus to those who may become seriously affected.

Families of virus diseases, some deadlier than others, are generally accepted by scientists, Dr. Meyer points out, but adds that this is not sufficient explanation for the marked differences in the effect of diseases on individuals. This is apparent in areas where yellow fever is common, the disease being routinely mild among children and routinely severe among adults. Poliomyelitis is a similar example, in some respects.

Dr. Meyer described as inadequate present concepts of the differential effects of viruses on individuals, these being attributed to variation in chemical reactions in the body, the action of enzyme systems, differences in the permeability of cell membranes, disturbances in sugar metabolism, or lack of cell proteins essential for proper growth of the virus.

The reaction threshold—the physiological conditions which are present when the disease ceases being mild and severe symptoms show up—offers a promising approach to the problem, the scientist says. "Until we understand the mechanism of the reaction threshold, the causes of latency will remain a mystery," he states.

Another phase of the problem of major importance is the latent condition persisting during convalescence from virus diseases. This type of latency plays a role in the perpetuation of viruses, Dr. Meyer says.

Science News Letter, February 15, 1947

SPARK SHOWER—Two ends of a rotor ring for a huge generator are being melted in a General Electric laboratory for welding together at temperatures approaching 3,000 degrees Fahrenheit. The apparent shower is caused by the fact that sparks and molten steel particles move too fast for the camera.

ENGINEERING

Russia Reopens Gigantic Hydroelectric Plant

➤ RUSSIA'S gigantic hydroelectric plant on the Dnieper river in the Ukraine is in operation again, after a nearly six-year interval since its destruction in 1941 by the Soviet troops to prevent its use by Hitler's Nazis.

The new equipment is American-built. The first of three new General Electric generators has now been successfully operated at full speed, it is revealed, and the other two are far advanced in assembly.

GE engineers state that the new generators are the largest ever built, being 90,000-kva, the kilovolt-ampere unit of power which is equal to 1000 volt-amperes. They will be driven by three 100,000-horsepower hydroelectric turbines built by the Newport News Shipbuilding and Dry Dock Company.

Rebuilding the Dnieper Dam was begun in 1944 by Soviet Union engineers and workmen soon after the Nazi forces had beeen driven back. It will have greater power-generating capacity than before, although it was rated before as Europe's largest hydroelectrict dam.

Science News Letter, February 15, 1947

METEOROLOGY

Weather Control Predicted

With a machine that speeds up computations from hours to minutes, weather can be predicted in time to curb it with artificial fog and other measures.

➤ WEATHER CONTROL is predicted. It is not the type of control that would bring about climatic changes over vast areas, but a modification of local weather disturbances such as breaking up dangerous storms.

Other applications would be in causing rainfall when needed, preventing local killing frosts, eliminating fog on local areas and breaking up a hurricane, or changing its path.

The possibility of such weather control was discussed at the meeting of the Institute of the Aeronautical Sciences by Dr. V. K. Zworykin of the Radio Corporation of America. It would all depend, he said, upon information derived from very rapid calculations made from weather reports from regular observatories, the calculations being now possible by an electronic computing device.

The application of electrical and electronic methods to weather calculations, he stated, presages an enormous reduction in the time required for accurate weather forecasting. Although the devices in question stand only at the beginning of their development, it is quite conceivable that, ultimately, electronic devices specially designed for weather forecasting may yield predictions for days ahead in a matter of minutes.

The device itself would not predict weather; neither would it be used in control steps taken. It would merely compute, in minutes instead of the hours now required, the probabilities from data collected from extended areas regarding pressure, temperature, humidity, wind velocity at different altitudes and other information used by the weather forecaster. The control steps would follow the predictions.

Dr. Zworykin reminded his hearers of the many attempts made in the past to affect weather by explosive charges to dispel hail clouds, scattering electrified sand and ice "seeds" from airplanes to induce rainfall, burning smudges to protect citrus groves, and clearing fogs from airport runways with heat.

"The hope for effective weather control rests in the fact that the condition preceding many of the weather processes which it may be desirable to control is essentially unstable or metastable," he explained. They are "characterized by the accumulation of large amounts of potential energy during an extended period."

"Thus, while the energy finally released may be enormous, that required to trigger the release may be quite modest. Furthermore, the magnitude of the triggering energy required will greatly depend on the time and place at which it is applied. Since the electronic forecaster should make it possible to observe the effect of applying given amounts of energy at different points of the weather map almost instantaneously, it will point the way to the most economic measures which will lead to the desired change in the evolution of the weather."

"Essentially two different methods are available for providing the energy for altering the evolution of weather changes," Dr. Zworykin continued. "The first consists of spreading a combustible substance, such as oil on water, over a considerable area and igniting it. This will cause an updraft of the surface air and condensation at a higher level, modifying, at the same time, the motion of the air masses in the surrounding region."

The second method depends upon the reflection and absorption characteristics of a particular surface area, thus using solar energy itself to modify weather conditions. Examples in nature include the clouds that form over southern islands at fixed times of the day, and large burned-over, blackened land areas which act as centers for thunderstorms.

The latter "immediately suggests the establishment of weather control patches, eventually blackened by deposits of carbon, at strategic points," he said. "These highly absorbing areas could at will be converted into highly reflecting areas by the deposition of artificial fog, employing techniques which received wide application during the war."

Science News Letter, February 15, 1947

ENGINEERING

Sodium Soap Gives Mud Oil-Drilling Efficiency

➤ OIL-WELL drilling, a messy, muddy business, might be considered a most unlikely candidate for feminine attention; yet a Bakersfield, Calif., high school girl, Cecilia M. Self, has done something to make it more efficient without making it any less muddy. In fact, it is the mud itself that 15-year-old Miss Self has worked on; she has made a better and gooier mud, calculated to facilitate the work of the well-driller.

In oil-well-drilling jargon, "mud" is a mixture of powdered solid with a liquid, forced into the hole alongside the drill, partly to cool the bit, partly to prevent blow-outs due to underground gas pressure. There are certain disadvantages in existing formulae, both the earlier ones that were mixed with water and the oil-containing muds now coming into use. Miss Self's invention consists in the addition of a sodium soap to the mixture, which gives it viscosity and other properties nearer to the driller's ideal of what a really proper mud ought to be.

Miss Self reports on her work in this highly practical branch of science in an essay submitted along with other qualifications that have won her a place among 40 winners of all-expense trips to Washington, D. C., to take part in the annual Science Talent Institute there from Feb. 28 through March 4.

Science News Letter, February 15, 1947

GENERAL SCIENCE

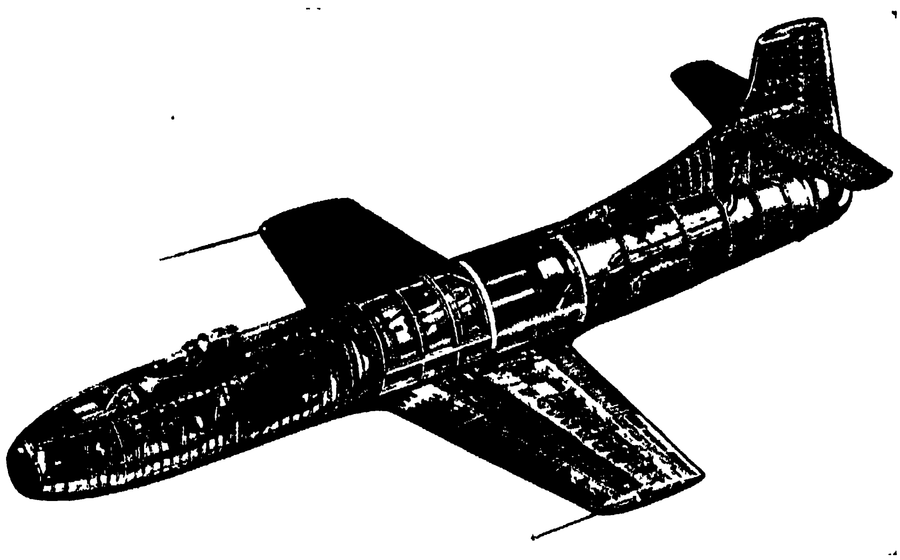
Miss Anne Hersey Named Science Talent Winner

➤ MISS ANNE HERSEY, 17, a student of Walton High School, New York City, has been named one of the 40 winners of the Sixth Annual Science Talent Search for the Westinghouse Science Scholarships. She will attend the Science Talent Institute in Washington, Feb. 28-March 4. The other winners have been previously announced by Science Service (see *SNL*, Jan. 25).

Honorable mention has been awarded to Miss Rosetta Victoria Natoli, 15, of Cathedral High School, New York City, as one of 260 mentions awarded.

Miss Katherine Virginia Anthony of Hunters, Wash., was found to be ineligible for competition in the search.

Science News Letter, February 15, 1947



SPEED RACER—The Navy D-558 is designed for a test plane to explore the needs of transonic aircraft.

AERONAUTICS

Navy Transonic Test Plane

➤ ANOTHER PLANE designed to best the atmospheric shock waves, that to date have prevented piloted craft from traveling as fast as sound, will be ready for field tests soon, the U. S. Navy reveals. It is the Douglas Skystreak, the D-558.

As soon as ready for flights, this new experimental plane will join the Army XS-1 at Muroc Field, Calif., where the advantages of Army facilities are available. The D-558 is a jet-propelled craft, a single-seater, powered with a General Electric TG-180 axial-flow turbo-jet engine. The turbo-jet depends upon atmospheric oxygen. That is why one important feature of the turbo-jet engine is the powerful compressor that gathers in enough air for the combustion.

The speed of sound at sea level is approximately 760 miles an hour. Supersonic speeds are actually those faster than sound, but the term transonic is frequently applied to speeds of from roughly 600 to 900 miles an hour. The new Navy plane is announced as a craft to explore transonic speeds.

The D-558 will be an air-borne laboratory to help investigate the many unusual conditions encountered by a plane at extreme speeds. The extreme thinness of its wings is experimental. Pressure on the outside of the plane will be recorded at 400 points. The recorded data are expected to provide information about the flow of air around the plane, and particularly the information and location of the so-called shock-waves that grip a plane at high speeds, creating a heavy drag.

Outstanding reasons why aircraft have met with disaster at high speeds have been loss of control and structural failure. The instruments in the new plane will give airplane engineers performance figures concerning the great increase in drag encountered when the plane approaches the speed of sound. They will also provide information to determine the effectiveness of conventional control surfaces at the speeds when the shock waves tend to throw a plane out of control.

In the development of the Bell Aircraft Army XS-1 and the Douglas Navy D-558, the National Advisory Committee for Aeronautics played an important part. It is this organization that has carried on the research in aerodynamics that may lead to breaking down the present supersonic barrier. Engines for extreme high speeds are available. The search is for construction that can withstand the shock in the higher speeds, and the design of airfoil that furnishes minimum drag. This applies to both fuselage and wings.

Science News Letter, February 15, 1947

Gasoline can now be made from natural gas at a cost competitive with petroleum products.

ELECTRONICS

Mathematical Formulae Drawn with Electronic Pencil

➤ MATHEMATICAL formulæ of the electronic age are appropriately drawn with a pencil of electrons, in an ingenious piece of apparatus constructed by Irwin H. Cole, 17, high school senior at Cliffside Park, N. J. It consists of an oscilloscope hooked up to a circuit of Mr. Cole's own designing, and built largely of junk parts. It took much of his spare time for a year and a half to make the machine work to his satisfaction.

When two equal voltages 90 degrees out of phase are impressed on the instrument, the image of a circle appears on the screen. The figure can be changed to an ellipse by changing either the horizontal or the vertical voltage. By expressing the terms of any suitable mathematical formula in terms of voltage variations, it is possible to trace a graph representing it in lines of light.

Mr. Cole is one of 40 winners in the Sixth Annual Science Talent Search, conducted by the Science Clubs of America under the auspices of Science Service.

Science News Letter, February 15, 1947

CHEMISTRY

International Meeting Of Chemists in London

➤ THE FIRST international gathering of chemists since the war will be held this summer in London, July 16 to 24. This Congress will follow immediately the centenary meeting and celebrations of Great Britain's Chemical Society.

Like the actual 100th anniversary of the formation of the Chemical Society, the Eleventh International Congress of Pure and Applied Chemistry should have been held in 1941 but it was postponed because of the war. A large delegation of American chemists to the July congress will be led by Dr. Marston T. Bogert of Columbia University who is president of the International Union of Chemistry.

The congress, under the presidency of Viscount Leverhulme, will have sections devoted to inorganic and geo-chemistry, physical chemistry, organic chemistry, biochemistry, chemistry in relation to agriculture and applied botany, chemistry in relation to applied zoology and veterinary science, chemistry in relation to food and nutrition, chemistry in relation to medicine and therapeutics, chemistry in relation to fuel, power and transport, chemistry in relation to natural and artificial textiles, chemistry in relation to plastics, glass and ceramics, chemistry in relation to metals, chemical engineering.

Science News Letter, February 15, 1947

PHYSICS

Photoelectric Apparatus Inspects Many Things

➤ PHOTOELECTRIC apparatus for the automatic inspection of all kinds of things—cigarettes and cartridges, doughnuts and doorknobs, oranges and onions—is the subject of six new U. S. patents, 2,415,174 to 2,415,179 inclusive, issued to Samuel C. Hurley, Jr., of Danville, Ill.

Core of Mr. Hurley's system is the use of pairs of phototubes, so spaced that when the object to be inspected for size is passed between them and a light source, one of the tubes has a shadow cast upon it while the other remains illuminated, provided the article is of the right size. This throws the electric circuit of the apparatus into a state of imbalance, actuating a selector mechanism that puts the object into the accepted class. If shadow falls upon both tubes, the object is too large; if both tubes remain unshadowed, it is too small; in either case it is automatically tossed into the box of rejects. Variants of this idea permit inspection for fidelity to standard shape as well as for proper size.

Science News Letter, February 15, 1947

CHEMISTRY

Sulfur Dioxide Dried In Acid Production

➤ SULFURIC ACID, which may fairly be said to be the keystone in the arch of chemical industry, is made with greater efficiency and economy through a process on which two Canadian chemical engineers, I. R. McHaffie and H. R. L. Streight, both of Montreal, have received patent 2,415,142. In this, the initial input of wet sulfur dioxide is thoroughly dried by passage through concentrated sulfuric acid before it is converted into sulfur trioxide preliminary to final conversion into sulfuric acid. The water absorbed by the acid in the drying towers is removed by contact with the hot, dry waste gases coming off at the final stage of the process.

Science News Letter, February 15, 1947

IN SCIEN

BACTERIOLOGY

Mucus Protects Cold Germs In Air Against Attack

➤ A NEW BARRIER to success in air disinfection to stop the spread of disease has been discovered by Dr. K. B. DeOme, University of California veterinary scientist.

Fresh support for warnings against spitting and sneezing except into disposable handkerchiefs also appears.

The mucus from noses and throats protects bacteria in the air from the lethal effects of high temperature and humidity, glycol vapors and ultraviolet radiation. Dr. DeOme reported to the Pasteur Society of Central California meeting in Berkeley.

The survival rate of unprotected bacteria in the air decreases as the temperature or relative humidity or both increase. Glycol vapors and ultraviolet radiation easily kill bacteria unprotected by mucus except at very high or very low humidity.

Science News Letter, February 15, 1947

RADAR

EAGLE Radar Antenna Distinguishes Targets

➤ DETAILS of revolutionary radar equipment, used on B-29 Superfortresses in bombing Japan late in the war, were revealed by Army Materiel Command officers. The equipment was designated EAGLE.

The unique feature of the EAGLE bombing system is a 16-foot linear antenna structure, housed in an auxiliary vane or wing carried beneath the B-29 fuselage and parallel to the wing of the aircraft. Differing from the usual rotary dish or spinner antennas used on other airborne bombing radars, the EAGLE has a row of 250 minute individual antennas spaced along the 16-foot framework.

This unusual antenna arrangement enables radar bombardiers to distinguish targets from surrounding terrain and to drop bombs with greater precision. It has civilian applications and can be used as electronic aids in all-weather flying.

Science News Letter, February 15, 1947

FIELDS

MINERALOGY

Titanium to Be Used In Construction Field

➤ ANOTHER LIGHT metal, titanium, may soon join aluminum and magnesium in the construction field. The principal present use of this abundant, but little known, metal is as a chemical compound, a white pigment in white paint.

Now, because of an improved process of reduction of its ore, it will be available for use as a pure metal in machinery and in structures.

Until about 1900, practically no pure titanium had ever been made except in laboratory experiments. Since then, several methods for reducing the ore have been developed, but none entirely satisfactory for commercial production. By a modification of some of these methods the U. S. Bureau of Mines has developed a process that promises to make the metal relatively plentiful.

A pilot plant of the Bureau is making 100 pounds a week. A commercial plant, with improved engineering, can produce far greater quantities.

The process used by the Bureau of Mines consists of reducing titanium tetrachloride with pure molten magnesium in the presence of helium gas under pressure. This non-combustible gas prevents oxidation in the process.

Science News Letter, February 15, 1947

PLANT PHYSIOLOGY

Baby Orchids Stay Infants With Barbiturate Dope

➤ INFANT ORCHID plants, that grow but never grow up, have been produced in the botany laboratories of the University of Wisconsin by "doping" them with barbiturate drugs of the too-familiar chemical family of sleeping compounds against which warnings are frequently issued nowadays. Prof. John T. Curtis reports on the strange behavior of these permanently juvenile lumps of plant tissue in *Science* (Jan. 31).

He chose orchids for his experiments because orchid seeds, unlike all other seeds, contain only the embryo plants, without reserve food supply of any kind. As horticulturists know, orchid seedlings have to be carefully nursed for months on a carefully prepared synthetic diet.

Prof. Curtis' "doped" embryos grew in flasks on regular orchid baby-food, which nourished into normal seedlings control lots of undrugged embryos. They came to be bigger than the seedlings, but showed practically no signs of differentiation into regular plant parts like roots, stems and leaves. They resembled in many ways the artificially cultured, detached pieces of roots and wound callus first grown at the Rockefeller Institute, Princeton, by Dr. Philip White, now of the Cancer Research Institute in Philadelphia.

Prof. Curtis states that he does not know why the barbiturates should have this strange effect, but is continuing his studies in an endeavor to find out.

Science News Letter, February 15, 1947

ENGINEERING

Process Makes Steel Flow; May Reduce Cost of Objects

➤ GREATLY REDUCED costs for the production of many common steel objects such as machine parts for airplanes and automobiles are possible for American industry with the use of a German process to make cold steel "flow" under tremendous pressures, an American investigator to Germany said.

W. W. Galbreath of the Commerce Department's Office of Technical Services described the German production of extruded steel parts and shapes with special dies and the application of a phosphate bonderizing treatment.

"If American manufacturers are able to use the bonderizing process to the same extent that it is being used by the Germans, and if they are also able to reduce the number of drawing and annealing operations, the savings will run into unbelievable amounts," Mr. Galbreath declared.

Pressures of from 170,000 to 230,000 pounds per square inch are used on common soft bar stock steel by the Germans. The investigator said the cold-extruded steel parts require little or no machining.

American work on the process is now underway at the Heintz Manufacturing Company, Philadelphia, under contract with the U. S. Army Ordnance Department, it was reported.

Science News Letter, February 15, 1947

MINERALOGY

Copper, Lead, Zinc May Be Scarce Throughout World

➤ COPPER, lead and zinc, metals which may become scarce in the United States within a few years as reserves are diminished, will probably be in short supply throughout the world in less than 40 years.

Statistician William P. Shea, C. Tennant Sons and Company, estimated that copper reserves in the world outside the U. S. will last only 36 years at current production rates. Lead reserves are only 24 years and zinc 30 years, he reported in the *Engineering and Mining Journal* (Jan., 1947).

The life of U. S. reserves of these metals has been estimated by the Bureau of Mines and Geological Survey at 34 years for copper, 12 years for lead and 19 years for zinc.

Commenting editorially, the *Journal* said that Mr. Shea's figures showed the U. S. could not depend on foreign sources of the three metals without depleting foreign reserves faster than our own. Despite the threat of shortage in this country, the U. S. is estimated to have 21% of the world's commercial copper reserves, 14% of the lead and 19% of the zinc.

Science News Letter, February 15, 1947

AERONAUTICS

Jet Engines May Provide Wind Tunnel Gales

➤ JET ENGINES may in the future provide the swift artificial winds that are needed to test and provide design data for supersonic jet planes for war and peace in the coming years, Dr. Francis Clauser of Johns Hopkins University told the American Physical Society.

Wind tunnels of very great cost and power are being built for research upon flight beyond the speed of sound, he explained. Modern aircraft and missiles that have jet propulsion systems supply large amounts of power with relatively simple installations.

In analyzing whether ram jets, turbo jets, pulse jets, and other such devices can be used to speed up the air in a wind tunnel, Dr. Clauser found that a ram jet can not be used, but he hopes that combinations of other jet thermodynamic systems will do the job.

Science News Letter, February 15, 1947

METEOROLOGY

Weather Forecasts Ahead

New instruments and techniques make accurate long-range forecasts possible. Predictions are made from lower atmosphere and stratosphere observations.

See Front Cover

By A. C. MONAHAN

➤ GIGANTIC forward steps in the science of weather have been taken in the past decade, and more developments are yet to come from intensive studies being made with new instruments and techniques. World-wide weather observatories also are important, and promise to play an even greater part as international cooperation progresses.

More accurate weather forecasts, both immediate and for days ahead, are available now than ever before, but still more accurate predictions are hoped for. A number of astronomers believe that accurate weather forecasts several months in advance may result from the study of relations between the weather and solar activities. For the present, however, forecasts will be made from observations in the lower atmosphere and the stratosphere.

A wedge of cold air that meteorologists call a cold front produced cumulous clouds shown in the Air Transport Command photograph on the cover of this SCIENCE NEWS LETTER.

Credit for Forecasts

Aviation deserves much credit for the increased interest in weather forecasting but not all. Military and industrial activities are much concerned. Modern warfare requires reliable weather predictions before combat activities are initiated, and thousands of industrial products are now produced under controlled temperature and humidity conditions, and factory management studies daily forecasts in order to regulate properly their operations.

Much credit is due to the U. S. Army and Navy for their wartime weather services which cooperated with each other and with the U. S. Weather Bureau. Many of their activities in weather research and reporting are being continued. The Coast Guard also deserves credit, particularly for its work in maintaining floating weather stations on the ocean.

Some of the new instruments now used in weather detection and in assisting forecasting were developed for the armed forces for entirely different purposes. This is particularly true for radar, for infra-red receivers, and even for ENIAC, a coined name for a rapid calculator which should make speedy weather forecasts possible from data collected at far-flung observatories.

Radiosonde and sferics are purely weather devices, as are also special instruments developed for use in airplanes which make weather records and in some instances transmit weather conditions by radio code.

The discovery that radar could be used in weather observation is credited to American bombers en route from Pacific islands to bring devastation to Japanese war plants. Their navigators soon learned that strange spots on their radar scopes were storm clouds ahead. The discovery was immediately put to practical use and undoubtedly many B-29 bombers made safe trips because they were able to avoid storm areas which their radar had detected.

A notable example of peacetime application of radar to weather is the cooperative work during the past thunderstorm season in the Florida region in which the Weather Bureau, the Army and Navy worked together in studying electric storms, hurricanes and other atmospheric formations. Other instruments were used, of course, and sferics played an important part.

Sferics can locate a thunderstorm 1000 miles away. The term is a liberal contraction of "atmospheric electricity." Sferics are atmospheric electrical discharges, either actual thunderstorms or non-visible disturbances associated with air movements that may form rain clouds. They are dependable indicators of bad weather. The word is applied to the electrical discharges as observed by special radio equipment. Two stations are necessary to fix the position of a storm, which is located accurately by triangulation.

Radiosonde is an instrument for making vertical weather observations from the ground upward through the atmo-

MAP-MAKING—A junior meteorologist assembles plotted sectional weather map prior to analysis by forecasters at the U. S. Weather Bureau.

sphere and stratosphere, usually to an altitude of 12 miles. The device is carried aloft by a hydrogen-filled balloon that bursts when the atmospheric pressure becomes sufficiently low. The apparatus then descends to the earth by parachute. It is often lost, but this is not a serious matter because during its ascent it sends out continuously code signals to its station.

These signals indicate temperature, relative humidity and barometric pressure. A refined form of the instrument provides a radio signal suitable for tracking by radio direction-finding equipment on the ground. By this wind velocity and direction are revealed.

Cloud Detection

The infra-red device will serve its principal use in detecting invisible cloud formations in night-flying. Heavy clouds radiate a certain amount of heat. Heat radiation consists largely of infra-red rays, often called "black light" because it is invisible. The infra-red receiver used in the plane is a type of a telescope within which the invisible rays are converted into visibility by use of electrons and a fluorescent screen. It was a vital part of the Army sniper-scope.

ENIAC is a coined name applied to a high-speed electronic device which enables very rapid calculations to be made. The machine was used during the war to compute complex bombing trajectories. In weather forecasting it is a help because mathematics plays an important part. Ordinary methods used in the mathematical computation of weather data from scattered observatories are too slow to give rapid results.

One great lesson of the war was the value of world-wide weather observatories, particularly for forecasting a few days ahead. World-wide weather forecasting, based on reports from widely scattered observatories encircling the globe, promises to become one of the first important steps in international co-operation. Weather conditions affect international communication and trade whether by plane, radio or surface ships.

CHECKING UP—A pilot's flight plan is checked against a weather map produced every six hours. Weather reports received since the map was made up are shown on each side of the map at the U. S. Weather Bureau at Blackland Army Flying School, Waco, Tex.

An important step in international co-operation was taken at the recent London conference when nine nations agreed upon a plan for weather reporting from floating stations in the North Atlantic. The agreement was reached on Sept. 26, 1946. Belgium, France, Norway, Sweden, the Netherlands, Eire, Britain, Canada and the United States signed. Four others may in the near future.

Under the plan 13 vessels of the various nations will serve as floating weather stations between Newfoundland and Europe. They will not only take observations and make frequent reports by radio, but also will be available for search and rescue missions. Their reports will tie in with others from Iceland and Greenland. The Greenland station is now maintained by the United States with the permission of Denmark to which Greenland belongs.

Of significance also is the string of weather observatories to be established soon in Arctic regions across northern Canada. These will mean much to the United States because northwestern Canada is the originating point for many frigid masses of air that invade the states. These stations are being erected to secure data for the Canadian-United States Joint Defense Board, but they will serve a wider purpose. Some of them will undoubtedly become permanent to help in daily forecasting in both America and Canada.

These northern Canadian stations will form the connecting link between the North Atlantic stations and those already established in Alaska proper and on the Aleutian islands. Reports from these latter are now being supplemented by Army observatory converted bombers flying daily from Castle Field, Calif., to Anchorage, Alaska.

These planes, equipped with all sorts of weather instruments, make hourly reports during the 12-hour flight on their 2400-mile trip. They fly at about a 500-foot altitude, well off the western coast from California to Vancouver, when

(*Turn to page 108*)

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Do You Know?

Static in automobile radio receivers is due sometimes to static electricity developed by tire friction, some automobile engineers claim.

Mine *telephone* systems that allow trapped miners to communicate with rescuers are lessening the dangers of this hazardous occupation.

The four enemies of *paint* on metal surfaces are rust and scale, oil and grease, moisture, and salt deposits; unless removed before paint is applied the coating will soon need renewal.

The presence of sugar in the mouth encourages the growth of bacteria such as *Lactobacillus acidophilus* and other acid-forming micro-organisms associated with tooth decay.

Gold leaf is made of a gold alloyed with 2% copper and silver, for strength, which is rolled and re-rolled until a two-inch bar of the alloy becomes a ribbon 12 yards long; by beating action this is widened and made much thinner.

From Page 107

they ascend to 10,000 feet. The region covered is the breeding place of many storms that finally reach the West Coast and the western slopes of the Rockies.

Weather reports from the Aleutians are further supplemented by Russian reports from Siberia. During the war the United States maintained two stations in eastern Siberia. American operators have now been withdrawn from them, but the U. S. Weather Bureau exchanges daily reports with Russia. The Soviet Union, the Bureau states, also has been cooperative in converting its reports for use in American historical maps of the northern hemisphere which are used in long-range forecasting.

Siberian weather conditions are of interest to American planes and surface ships following the Great Circle route to Asia. They are essential in forecasting in the Japan-Okinawa area because much of the weather there depends upon Siberian conditions. Cooperation with the Soviet Union is highly desirable in this matter.

Mid-Pacific routes to the Far East now have the benefits of American weather stations on Guam, the Philippines, Wake and other Pacific islands. South American trade is helped by stations in the Caribbean region, and Mid-Atlantic routes are warned of storms by weather planes flying from Florida to the Azores. Soviet stations from Norway to Bering, reported soon to be established, will complete the Northern Hemisphere coverage.

Science News Letter, February 15, 1947

CHEMISTRY

Benzol Vapor Oxidation Process Produces Phenol

➤ PHENOL, basic alike to plastic resins and disinfectants, is produced by the oxidation of benzol vapor in the presence of heat and a catalyst, in the process on which patent 2,415,101 has been granted to R. H. Krieble of Schenectady and W. I. Denton of Woodbury, N. J., assignors to the Socony-Vacuum Oil Company. An essential step in the process is continuous addition of fresh benzol with impurities containing paraffin, cyclohexane, etc.

Science News Letter, February 15, 1947

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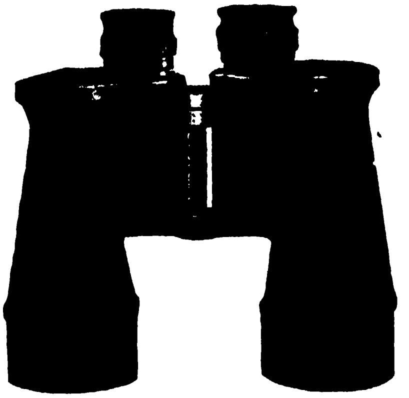

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OPTICS—Set includes all Lenses and Prisms you need for assembling 7 x 50 Binoculars. These Optics are in excellent condition—perfect or near perfect and have new low reflection coating.

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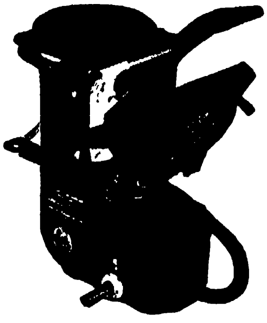

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METEOROLOGY

NATURE RAMBLINGS
by Frank Thone

Snow Significances

➤ SNOW'S importance to the crops has long been recognized even to the extent of embodiment in proverbs and folk-sayings. There is, for example, an old English rime:

"A foot deep of rain
Will kill hay and grain,
But three feet of snow
Will make them grow moe."

Before that jingle was written, in the seventeenth (or possibly the sixteenth) century, generations of farmers had known from first-hand experience that the gradual melting of deep snow at the beginning of spring, moistening the soil just when reviving plant life needed it most, could be an excellent thing, whereas torrential downpours of rain a little later might very easily bring calamity.

This old-time folk wisdom was distilled on the spot, at a time when climate and its significance had local significance only. But in these times of long hauls of almost all products, you may be getting the good out of snowfalls hundreds of miles away without ever realizing it.

For example: Do you like baked Idaho potatoes? Most of them are raised on irrigated lands, with the water coming from the previous winter's snows in the northern Rockies. Do you eat California oranges or avocados? These again are from irrigated orchards, whose ditches are filled with snow water from the high Sierra. Do you use sugar in your coffee? Quite likely it's beet sugar, from somewhere in the Great Basin area, or perhaps from fields on the eastern slope of the Rockies—in any case, the 11 water molecules represented in each molecule of sugar most probably drifted down as snowflakes onto some mountainside before they found their way into the irrigation system. Do you like Western beefsteaks and roasts? The steers that supplied them may have been fed on snow-nourished alfalfa, and got their daily drinking-water from a snow-supplied creek in Montana before being moved to an Iowa feed-lot to be fattened on corn before going to the packing-house.

If you live in a frame house, the wood of which it was built came from forest trees that took good care of its winter snows, building their melt-water into their woody stems, through spring after spring for many years before they were felled and sawed into lumber. If on the other hand you live in a brick structure, the clay from which the brick were made probably came from a morainal deposit left by a glacial ice sheet—which was formed of consolidated masses of snowflakes that fell a million years ago.

Science News Letter, February 15, 1947

PHYSICS

Transmitted Waves Detect Flaws in Metals, Plastics

➤ FLAWS WITHIN metal can be detected with certainty by means of transmitted waves, similar to those of sound, that vibrate at a rate of millions of times a second, General Electric scientists revealed.

The method may be used to detect flaws in plastics and ceramics, as well as in metals, and is claimed to be more satisfactory in some cases than the technique that employs X-rays.

The instrument used in the new testing method is a single unit of what is called a complete ultrasonic wave transmitting-receiving system. It sends out sound waves at a frequency rate too high to affect the human ear, but which are affected by such flaws as internal cracks, voids, porosity, poor bonds and others. The instrument receiver notes any wave modification.

Science News Letter, February 15, 1947

The portable device is expected to be of special service on an assembly line to make internal tests.

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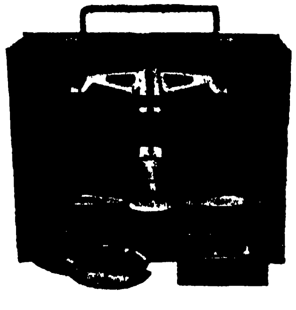

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Books of the Week •

A62 GUIDE FOR MODULAR COORDINATION—Myron W. Adams and Prentice Bradley—*Modular Service Assn.*, 271 p., illus., $10. American Standards Assn. project for coordination of dimensions of building materials and equipment.

ABC'S OF VISUAL AIDS AND PROJECTIONISTS MANUAL—Philip Mannino—*Published by the author*, 83 p., paper, $1. The physical handling of films and equipment with special emphasis on mechanical difficulties that may be encountered.

THE ANATOMY OF THE NERVOUS SYSTEM; Its Development and Function—Stephen Walter Ranson—8th ed. rev., Sam Lillard Clark—*Saunders*, 532 p, illus., $6 50. A textbook of neurology.

BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA—Vol. 36, No 3, July 1946—George D. Louderback, ed.—*Univ. Calif. Press*, 322 p., paper, $4 per year, single copies $1. This issue is a catalogue of Philippine Earthquakes from 1589-1899.

COLLEGE ALGEBRA—Thurman S. Peterson—*Harper*, 334 p., $2 50. A textbook for college students who have had at least one year of secondary school algebra. It contains a complete review of elementary algebra.

COLONIAL AGRICULTURAL PRODUCTION—Sir Alan Pim—*Oxford Univ. Press*, 190 p, $3. A survey of the two systems of colonial agricultural enterprise—both plantation and small holding—and an attempt to reconcile the two into modern agrarian economy.

DROUGHT, Its Causes and Effects—Ivan Ray Tannehill—*Princeton Univ. Press*, 264 p., illus., $3. A new point of view underscoring the importance of the problem of drought and a need for more of the basic facts on the weather on a world-wide scale.

FERNS—William Alphonso Murrill—*Published by the author*, 96 p., illus., paper, $2.40. Based upon an intimate association with ferns for over sixty years in many lands.

HARVARD COLLEGE OBSERVATORY, The First Century, *Harvard College Observatory*, 94 p, illus., paper, $1. A review of the past and a preview of the future of this institution.

I MARRIED A RUSSIAN; Letters from Kharkov—Lucie Street, ed.—*Emerson*, 331 p., $3. Letters from an English girl who married a Russian scientist, which tell of the Soviet country as it went through violent changes in peace and war.

INTERNATIONAL CONTROL OF ATOMIC ENERGY; Scientific Information Transmitted to the United States Atomic Energy Commission, Dept. of State Publ. 2661—Bernard M. Baruch—*Govt. Printing Office*, 195 p., paper, 30 cents. Collection of six volumes of scientific information prepared to assist in providing a reasonable understanding of the problems before the Commission.

INTERNATIONAL CONTROL OF ATOMIC ENERGY: Growth of a Policy, Dept. of State Publ. 2702—*Govt. Printing Office*, 281 p., paper, 45 cents. An informal summary record of the official declarations and proposals relating to the international control of atomic energy between Aug. 6, 1945, and Oct. 15, 1946.

NEW WORLD OF CHEMISTRY—Bernard Jaffe—*Silver*, rev. ed., 710 p., illus., $2.88. A high school text covering up-to-date topics as well as fundamentals.

THE PACIFIC SPECTATOR—John W Dodds, ed.—Vol. I, No. 1, Winter 1947, *Stanford Univ. Press*, 132 p, paper, $3.50 per year; single copies $1. Quarterly journal of opinion sponsored by twenty Pacific Coast universities and colleges.

PRESSURE COOKERY—Leone Rutledge Carroll—*Barrows*, 171 p., illus., $2. Recipes for every household, discussion of this new time-saving way of cooking.

QUANTITATIVE CLINICAL CHEMISTRY, Interpretations, Vol I—John P. Peters and Donald D. Van Slyke—*Williams & Wilkins*, 1040 p, $7. A second edition covering overall energy changes, and the chemistry and metabolism of the three major foods—carbohydrates, lipids and proteins.

TIME FOR SCIENCE INSTRUCTION, Yearbook—*National Science Teachers Assn.*, 51 p, paper, 50 cents. How teachers and school officials can find sufficient time for the important task of teaching science in and out of school hours

UTERINE CONTRACTILITY IN PREGNANCY—Douglas P. Murphy—*Lippincott*, 134 p., illus., $5. A study of the contractions of pregnancy and labor under normal and experimental conditions.

Science News Letter, February 15, 1947

ENTOMOLOGY-BACTERIOLOGY

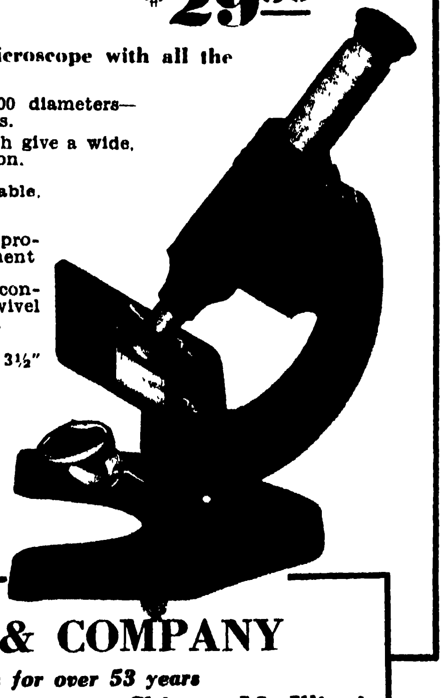
Insects Carry Bacteria That Fix Nitrogen of Air

➤ INSECTS of several widely different kinds keep in their bodies colonies of bacteria that have the ability to fix atmospheric nitrogen, and thus keep their hosts supplied with a necessary type of food which they would otherwise not get, states Dr. Jaroslav Peklo of the Phytopathological Institute of Prague, Czechoslovakia, in *Nature*.

Among the insects studied by Dr. Peklo are aphids and thrips, which suck the sap of plants; flour-moth larvae, which feed practically altogether on starch; and larvae of bark-boring beetles, which eat mainly cellulose. All these diets are lacking in proteins, which are supplied by the nitrogen fixing bacteria.

The bacteria found in all the insects have been identified as belonging to the genus Azotobacter, long known as a nitrogen-fixing organism in the soil.

Science News Letter, February 15, 1947



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• New Machines and Gadgets •

✿ *ELECTRONIC OVEN now available for food servers cooks a whole chicken in six minutes and a steak in 40 seconds. Cooked meals, frozen and stored in a refrigerator, are readied for serving in two minutes. The self-contained unit operates on 230-volt 60-cycle current.*

Science News Letter, February 15, 1947

✿ *MAGNESIUM steak platters, designed for serving at the table as well as for broiling and frying, eliminate separate serving dishes and keep the meat hot because of their massive yet light construction. They are made for individual servings.*

Science News Letter, February 15, 1947

✿ *ADHESIVE for sealing corrugated paper boxes produces a permanent bond resistant to extremely high and low temperatures. It is easy and economical to use because it can be applied with a spray gun.*

Science News Letter, February 15, 1947

✿ *ALUMINUM SOLDER, developed in Switzerland, which requires no flux or flux substitute, is now available in America. With it aluminum equipment can be soldered with greater simplicity than by conventional methods, and joints are relatively free from damage by corrosion.*

Science News Letter, February 15, 1947

✿ *PREFABRICATED hog houses, of the type in the picture, are steel-sheathed, insulated with fiber glass, and ventilated by means of an adjustable turret top. They are light enough to be skidded from place to place by a farm horse.*

Science News Letter, February 15, 1947

✿ *POSTWAR truck with front-wheel drive can be built in any reasonable length because of the absence of a power shaft to the rear and the ordinary differential on the rear axle. The arrangement makes possible a low-level floor only 16 inches from the road.*

Science News Letter, February 15, 1947

✿ *ERRORLESS typewriter, electrically driven, sets up a line of type visible just above the keyboard for correction before actually printing. If there is an error, pressure on a button eliminates the line, which can then be rewritten. The next line is typed while the first one is printing.*

Science News Letter, February 15, 1947

✿ *TELEVISION receiver has a swivel mounting so that it can be pivoted to the right and left, and a rotatable switch for the selection of up to eight television channels. Flexible antenna, a special type of balanced input circuit, aluminum screen cathode tube, and a germanium crystal to detect the signal are other features.*

Science News Letter, February 15, 1947

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W. Washington 6, D. C., and ask for Gadget Bulletin 349. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.*

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Question Box

AERONAUTICS

What powers the XB-48? p. 101.

BACTERIOLOGY

What barrier to air purification has been recently discovered? p. 104.

ELECTRONICS

How does an electronic pencil draw mathematical formulae? p. 104.

ENGINEERING

How does sodium soap help oil-drilling mud? p. 103.

MEDICINE

How are latent infections important in epidemics of virus diseases? p. 101.

How does streptomycin check TB? p. 99.

METEOROLOGY

How do snowfalls hundreds of miles away affect you? p. 110.

How was radar's usefulness in weather observation discovered? p. 106.

What are possible applications of weather control? p. 102.

MINERALOGY

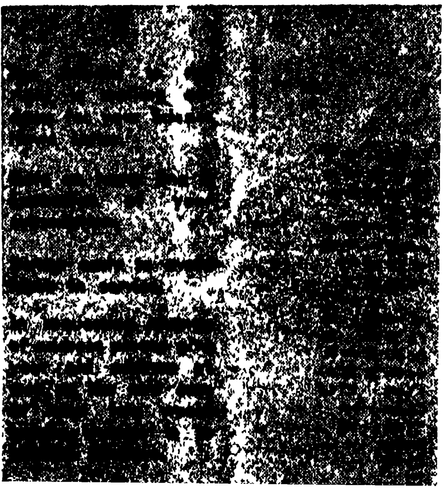
By what process can titanium be made relatively plentiful? p. 108.

PHYSICS

How do mesons disintegrate to bombard the atmosphere with cosmic rays? p. 100.

How may cosmic rays be more important than atomic energy? p. 100.

Where published sources are used they are cited.



SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 22, 1947

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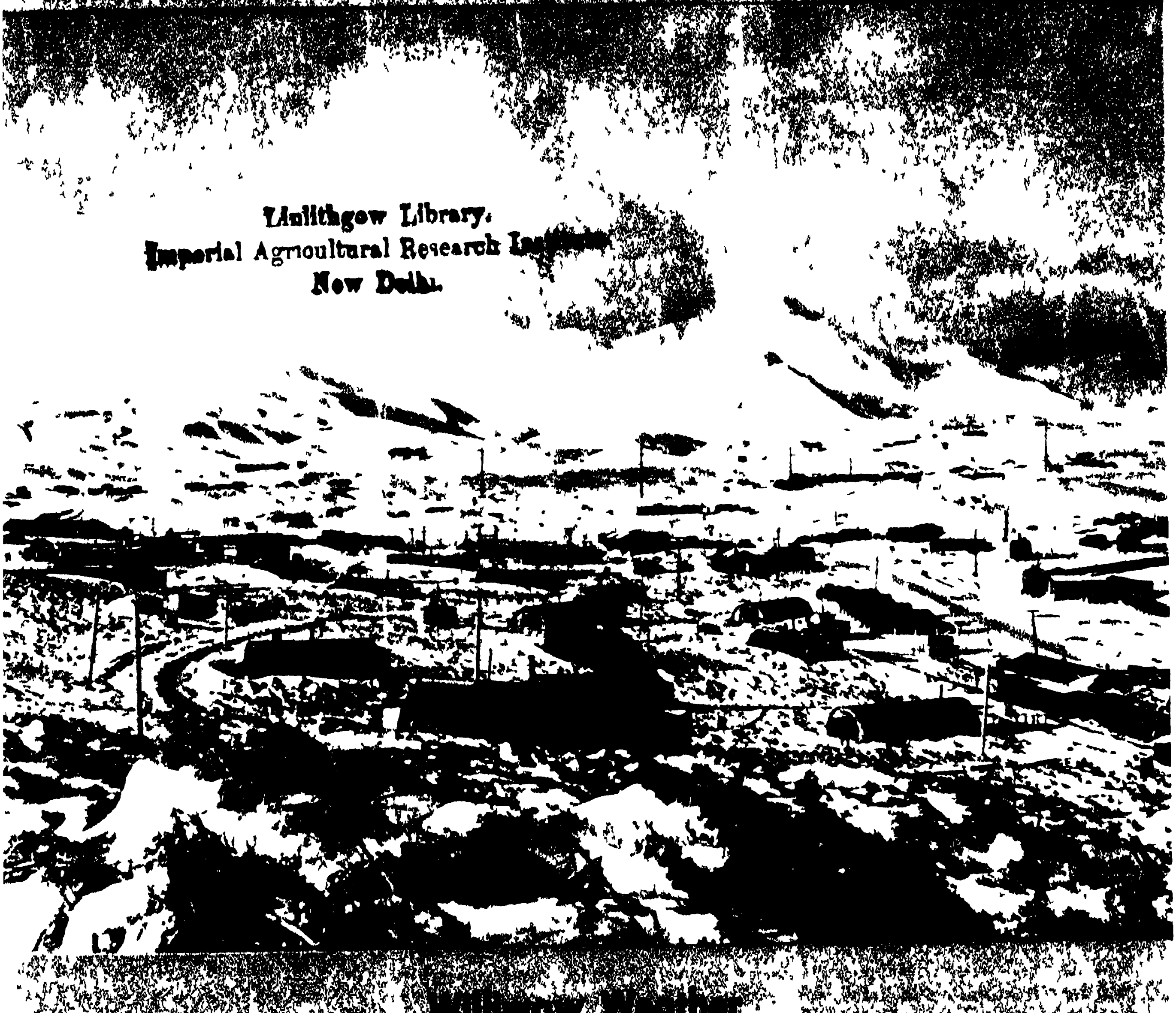


Williwaw Weather

See Page 124

A SCIENCE SERVICE PUBLICATION

HORTICULTURE

Citrus Fruit Threatened

"Quick decline", caused by a virus, is endangering orange and grapefruit trees. Virus has not been isolated and the carrier has not been identified.

➤ AN INVISIBLE virus is threatening the entire American citrus fruit industry. The disease of orange and grapefruit trees is called "quick decline."

Latest step in combatting it is the discovery that quick decline is due to a microscopically invisible, filter-passing virus. Dr. H. S. Fawcett and Dr. J. M. Wallace of the University of California's Citrus Experiment Station made the discovery. Belief that it might be due to mineral lacks in the soil had previously been disproven by experiments of their colleague, Dr. H. D. Chapman.

Drs. Fawcett and Wallace demonstrated the virus nature of quick decline by grafting shoots of diseased trees into branches of healthy ones, which subsequently became sick. Control grafts with healthy shoots into healthy trees produced no ill effects.

The virus itself has not yet been isolated, nor has the insect or other carrier that transfers it from tree to tree been found. These are next steps in the battle.

Outstanding symptom of quick decline, which occurs only in sweet orange and grapefruit grafted onto sour orange stocks, is a failure of the carbohydrate foods formed in the leaves to pass the graft junction into the roots. They are thus starved to death and presently decay; then the whole tree withers and dies.

Although Drs. Fawcett and Wallace do not mention it in their report, this fatal course of the disease is apparently identical with that observed in tristeza, highly fatal citrus-tree malady that is wiping out thousands of orange trees in Brazil and neighboring countries in South America, and is known also from South Africa and the Netherlands Indies.

This would suggest that quick decline and tristeza are one and the same disease, except for one thing: the spread of quick decline through an orchard is much slower than that of tristeza. Either they are not identical (though possibly related), or the virus is carried by a slower insect or other carrier, or some unknown factor in climate, soil, etc., works to retard the spread in California orchards.

Thus far quick decline has not been found in citrus orchards in Florida, Texas, Arizona or other states.

Science News Letter, February 22, 1947

ASTRONOMY

Solar Eclipse Expeditions

➤ AT LEAST nine expeditions are being planned by astronomers and amateurs anxious to observe the total solar eclipse on May 20 from points in South America, according to information received by Prof. Charles H. Smiley of Brown University from astronomer friends in Brazil, Argentina, England and New Zealand.

Three parties will observe from Argentina, but none of these will represent foreign groups. Six expeditions will have headquarters in Brazil, where totality will last longer. Two of these will be from the United States, one from England, one from New Zealand and two representing Brazil.

An expedition, under the direction of Dr. Enrique Gavioli, from the Argentine National Observatory at Cordoba, is expected to make its headquarters about fifty miles north of Cordoba. A group from the La Plata Observatory, probably headed by Dr. C. V. Cesco, will locate near Corrientes, in northern Argentina near the border of Paraguay, or at Tostado, southeast of Corrientes. This party may divide its work between the two sites. A group representing the Asociacion Argentina "Amigos de la Astronomia," under the leadership of Dr. B. H. Dawson, will observe the eclipse at Itati, also in northern Argentina near Paraguay.

In Brazil three sites are likely to be occupied. These include Araxa, about 300 miles northwest of Rio de Janeiro, by the Brown University-Skyscrapers Expedition, Lassance and Bocaiuva, about 400 miles north of Rio, by the National Geographic Society-Army Air Forces Expedition.

There will be in Brazil an expedition headed by Dr. C. B. Michie, representing the New Zealand Astronomical Society, and one led by Dr. J. A. Carroll from London, England. It is understood that two parties of Brazilian astronomers plan to observe the eclipse from points near Araxa and Lassance.

Science News Letter, February 22, 1947

ENGINEERING

Panama Soil to be Tested In View of Canal Proposals

➤ ROCK AND SOIL from the Panama Isthmus will be tested in Harvard laboratories within the next few months, the university revealed.

The tests will be to determine their ability to withstand earthquake shocks, volcanic activities, and the effects of vibrations set up by heavy explosions such as might result from bombs.

The testing is in connection with proposals to increase canal facilities between the Atlantic and the Pacific, now approaching the maximum of the present canal's capacity. Three such proposals are receiving serious consideration.

These include the addition of a third set of locks to the present canal; converting the present waterway to a sea-level route; and the digging of a new canal in another part of the Isthmus. The decision is a matter that rests with Congress; the objective is a waterway across the isthmus that will accommodate the largest commercial and naval ships, as well as the thousands of smaller craft that use the shortcut from ocean to ocean, and also to assure passageway from the Atlantic to the Pacific in spite of wartime enemy attacks.

The Panama canal, 50 miles in length, was opened Aug. 15, 1914, but was not officially completed until 1921. The cost to then was over $525,000,000. The surface of Gatun Lake, through which the canal runs, is normally 85 feet above sea level. The locks, by means of which ships are raised to the higher levels of the canal, were originally constructed about 1,000 feet long and 110 feet wide at their bottoms. The depth of the canal is 41 feet or over.

Science News Letter, February 22, 1947

That *hunting* is a favorite American sport is shown by the fact that nearly 10,000,000 persons paid $20,000,000 for hunting licenses during 1946.

VETERINARY MEDICINE

Livestock Disease Menace

Foot-and-mouth disease, that has touched a million Mexican farm animals, can threaten the livestock industries in the United States by crossing the border.

➤ A MILLION Mexican farm animals, more or less, are either sick of foot-and-mouth disease or have been dangerously exposed to it. About two-thirds of them are cattle; the rest are swine, sheep and goats. This situation not only endangers our neighbor nation's milk and meat supplies; it constitutes a real menace to the whole American livestock industry, even though the point of outbreak nearest to our boundary is still a good 300 miles away. It does not take long for an unchecked plague to travel that far.

For three weeks recently Dr. M. S. Shahan, U. S. Department of Agriculture veterinarian, was in the field with three American and several Mexican colleagues, conducting as complete a survey as possible in the nine Mexican states where the disease exists. They form a zone extending from Veracruz to Mexico City and somewhat beyond, with the plague-stricken areas extending principally along routes where animals are driven or transported.

Separated from this zone by a 150-mile gap is the state of Aguascaliente, where a single outbreak occurred in one village, mainly among work-oxen. This was the point of outbreak nearest American territory. All these animals, they were informed, have now been killed and deeply buried.

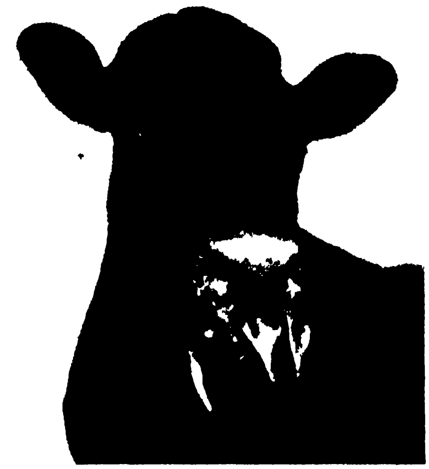
In the main zone of infection, little has been done thus far. Mexican agricultural authorities realize the seriousness of the situation, and they know that the one sure means of wiping out the disease is to kill all sick and exposed animals, bury them deeply, and disinfect the premises very thoroughly with strong lye water. But before you can kill off a farmer's livestock you have to compensate him for the loss; also, the disinfecting job isn't cheap. And the Mexicans have no money.

That is what makes the situation our problem as well as theirs. If the outbreak had occurred in this country both federal and state governments could have gone into action at once, with plenty of men and means. There has been an excellent cooperative spirit between the Mexican and American agricultural authorities; but of course there are a lot of things that have to be decided at higher official levels in both governments. The Secretary of Agriculture has asked Congress for legislation to enable us to cooperate with any American country in combating livestock plagues.

One of the things that the Department of Agriculture has wanted for a long time is a good, strong, tight fence along the very thinly patrolled U. S.-Mexican boundary. It would have to be high enough to prevent deer and antelope from jumping it, stoutly anchored enough to prevent peccaries or wild pigs from burrowing under it, as well as strong and tight enough to stop stray cattle. Stopping interchange of animal populations along the border would do much to prevent the transmission not only of foot-and-mouth disease but of other infections that can be carried by wild as well as domestic animals.

Efforts have been made to find out how this outbreak of foot-and-mouth disease got started in the first place. Strong circumstantial evidence points to the landing of some 300 zebu bulls at Veracruz in 1946. The animals had been brought for breeding purposes from Brazil, where foot-and-mouth disease is known to exist.

Science News Letter, February 22, 1947



DISEASED COW—This animal is infected with foot-and-mouth disease, hazard to the livestock industry.

ECONOMICS

U. S. Gets Few Machines, Bids for Nazi Plant

➤ THE UNITED STATES has been allotted "a few machines" from a German optical works and is bidding for a Nazi aluminum foil plant, but the dispute over economic unification of Germany has produced a virtual stalemate in reparations from the great industrial areas of the western occupation zones, State Department sources said.

The machines are from the famous optics plant of Hensoldt and Sons, at Herborn in the American occupation zone. First U. S. reparations granted by the Inter-Allied Reparations Agency, the machines will go to U. S. Navy arsenals. Most of the Hensoldt plant, which produced binoculars famed throughout the world, was allocated to The Netherlands.

The U. S. now has a bid in for the Tschelden aluminum foil plant in the French occupation zone. The bid, based on the demand in this country and the status of American equipment, will be passed on by the Inter-Allied group, which may give all or a part of the plant to the U. S. or allocate the plant entirely to other countries.

Meanwhile, the flow of German military production tools from the huge industrial reservoir of the western occupation zones has dropped to a small trickle. The State Department indicated that the U. S. delegation to the Moscow conference of foreign ministers next month will give high priority to the question holding up distribution of some of the world's most famous scientific and industrial equipment—economic unification of Germany.

Russia wants reparations to proceed before the economic differences are ironed out, but the western powers seek unification of the German economy before parcelling out the approximately 2,000 industrial plants in the western zones earmarked for reparations.

First full picture of the reparations situation in western Germany is expected in the annual report of the Secretary General of the Inter-Allied Reparations Agency. The report will be made later this month.

Science News Letter, February 22, 1947

ASTRONOMY

Data for Polar Explorers

➤ BY "SHOOTING the sun" for the sake of science in the Antarctic, H. C. Peterson, physicist on the Ronne Antarctic Expedition, plans to bring home new solar refraction data that promised to save the lives of lost polar explorers in the future.

Polar regions are the worst places in the world in which to get lost, according to Prof. Charles H. Smiley of Brown University. People stranded in the Arctic and Antarctic are likely to strike out in the wrong direction.

The sun circles close to the horizon a large portion of the time and present refraction tables, based on data gathered 75 to 100 years ago, are none too accurate when sextant readings must be taken with the sun low in the sky.

At sunrise and sunset the sun appears to be flattened to an oval. This illusion is caused by atmospheric refraction, bending of light rays as they enter the earth's atmosphere, and is most pronounced near the horizon. When complete data on the change in the apparent vertical diameter of the sun, caused by the change in the angle of refraction, have been gathered from pole to pole, new refraction tables are to be worked out at Brown University for the use of those navigating in polar regions.

Through the cooperation of the Bureau of Research of the U. S. Navy, the Finn Ronne Antarctic Expedition, now enroute to the south polar area, has agreed to carry out a program of observations from latitude 22 degrees south into the Antarctic. This will provide valuable data on atmospheric refraction at low altitudes.

Prof. Smiley and his party will cover the latitudes between Providence and Rio de Janeiro when he leads an expedition to Brazil in May to see the total solar eclipse. It is hoped that within the year the observations can be extended north into the Arctic, covering all latitudes.

The data gathered will help scientists choose among the various theories of atmospheric refraction. All theories agree for high altitudes. Research on low altitudes will tell which theory of refraction is best.

Science News Letter, February 22, 1947

SOCIOLOGY

Know Delinquents by Play

➤ PARENTS of earlier generations brought their children up in accordance with the old adage about Satan finding mischief for idle hands to do. Some justification for their idea appeared in a report by Dr. Dale B. Harris of the University of Minnesota to the American Association for the Advancement of Science.

The play interests of delinquent boys in their early teens was the subject of his study. They differ significantly from those of non-delinquents, he found. Generally they are "mischief and idle activities such as could arise from lack of supervision, late hours and carrying on activities permitted older persons, such as frequenting taverns, pool rooms and the like."

The delinquent or potentially delinquent boy can be located in terms of his play interests, Dr. Harris found, but varieties of delinquencies or types of delinquent play interests could not be differentiated except in a very broad sense.

Two patterns of play interests especially characteristic of delinquents appeared. One consisted of different gambling activities. The other, more juvenile in nature, was comprised of three activities: hitching rides on street vehicles, catching rides on freight trains, and stealing fruit and melons.

The association of these play interests with delinquency was not marked enough to be statistically significant, however.

"Probably," Dr. Harris concluded, "delinquency is associated with the sample accumulation of these idle, unconstructive interests. The patterns of activities have meaning only in relations to the wishes and needs of individual boys and not in terms of the outward appearance of the activities themselves."

Science News Letter, February 22, 1947

CHEMISTRY

New Chlorine Preparation Uses Two Old Processes

➤ CHLORINE, an indispensable element in chemical manufacturing processes all the way from bleaching cloth to making synthetic rubber, goes back to the thermal method of production in the process on which Alfred M. Thomsen of San Francisco has obtained patent 2,415,152. His process resembles two that were in use before present-day electrolytic methods superseded them, but avoids the difficulties that made the old methods obsolete. Critical step is the use of fragments of firebrick superficially impregnated with frequently renewed layers of cupric chloride as catalysts in the oxidation of hydrochloric acid to chlorine and water. Spent gases from the heating process involved in the impregnation are used to raise the temperatures of the gases involved in the process.

Science News Letter, February 22, 1947

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RADIO

Station in Lipstick Tube

Broadcasts can now be made from the word's tiniest radio station, that will fit into a lipstick tube. Radio the size of calling card to make debut.

➤ WORLD'S SMALLEST radio station, complete with a tube and circuit which will fit in an empty lipstick container, broadcast for the first time recently in Columbus, Ohio.

A complete radio on a plastic card the size of a calling card will make its debut in New York next month to complete the vest-pocket radio transmitting and receiving unit.

Dr. Cledo Brunetti, an electrical engineer at the National Bureau of Standards in Washington, demonstrated his tiny but complete broadcasting station to the Columbus section of the Institute of Radio Engineers.

He predicts that the printed wire process which makes his midget radios possible can reduce the cost of wiring radios 30% to 60%. Wiring cost, he adds, is a big item in the price you pay for a radio.

Vest pocket radios even may come with the vest of the future. Dr. Brunetti says that complete radio circuits can be printed on cloth.

The inch-long broadcasting transmitter and the "calling card" radio have been developed from the wartime proximity fuze which had a complete radio sending and receiving station to explode shells accurately near enemy planes. This was made possible with printed wire.

Instead of the complicated copper wires in your home radio set, the proximity fuze and Dr. Brunetti's radios use lines of "silver ink," a solution of fine silver or silver oxide, painted over a stencil to form a two-dimensional circuit. The carbon resistors are painted in over another stencil with a carbon solution to complete the circuit.

To complete a radio set, tiny tubes are soldered onto the printed circuits. Dr. Brunetti's lipstick container-size radio station has the circuits painted on a small tube.Tiny batteries from a hearing aid and a small microphone round out the complete equipment for the world's smallest radio station.

In addition to the inch-long broadcasting unit, Dr. Brunetti demonstrated two other transmitters. His "larger" transmitters have the midget tubes mounted on small plates. One of the plates with the printed wire circuit is about the size of half dollar.

The first broadcasts were made with special permission from the Federal Communications Commission, the agency which may be faced with the problem of regulating broadcasts from pocket-size radio stations in the near future.

Dr. Brunetti was one of the pioneers in the work on printed wire for the proximity fuze. The process is now produced commercially by the Centralab division of Globe-Union, Inc., Milwaukee, Wis.

First large-scale peacetime use of printed wire may come for hearing aids. A hearing aid, with miniature tubes and ordinary batteries, has been produced with a circuit one inch high and two and one-half inches long. Dr. Brunetti expects these units to be on the market in a few months.

Wires without wires for the proximity fuze were produced with stencils on ceramic plates. Research at the National Bureau of Standards since the war ended has revealed new methods of applying the process on many different materials.

Science News Letter, February 22, 1947

PHOTOGRAPHY AID—Pictures help toward understanding of science, is the thesis advanced by Miss Robin Cooley, 17, of the Albany (N. Y.) Academy for Girls, Science Talent Search winner. She enforces her point in her winning essay with this picture of several forms of coral.

PLANT PHYSIOLOGY

Chlorophyll Retains Light

➤ ONE OF THE mysteries of photosynthesis has been solved by University of California chemists. They have shown how chlorophyll holds on to light energy long enough for it to be stored in plants as sugar, starches, and other substances.

Photosynthesis is the process whereby nature maintains all life on earth. In this process carbon dioxide and water are combined, with the help of chlorophyll, the green pigment in plants, into the energy substances such as sugar.

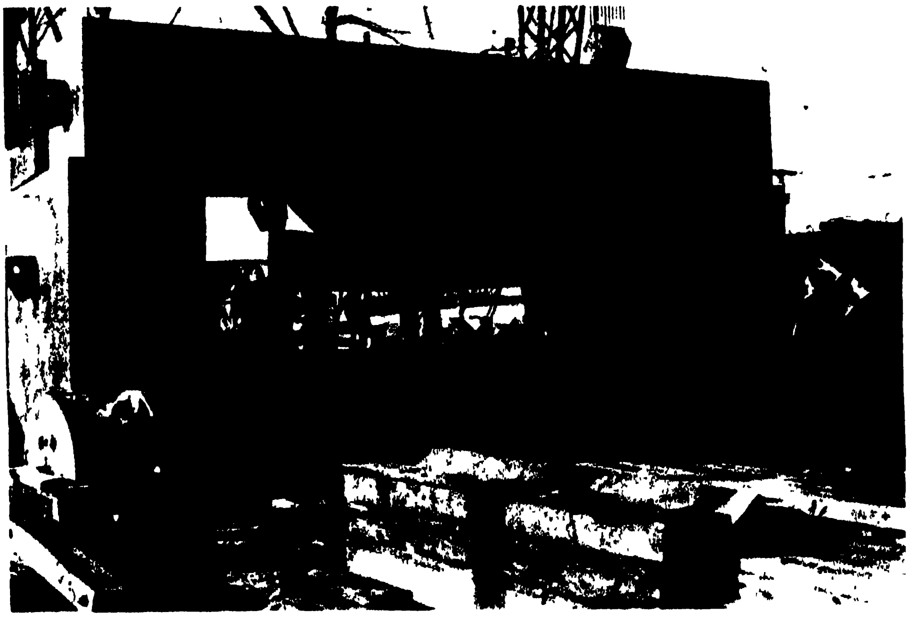
The Berkeley scientists have shown that chlorophyll has a phosphorescent quality. Earlier they had demonstrated that phosphorescing molecules are in a magnetic state. The shining of a light on these molecules literally boosts them up to this state, and they retain the light until they lose their magnetism.

This fundamental principle, one of the last scientific contributions of the late Prof. G. N. Lewis, was demonstrated by suspending a fluorescein-containing glass between the poles of an electro-magnet. A strong light thrown on half of the glass made it swing quickly toward one of the poles, showing the fluorescein molecules had been magnetized.

Dr. Melvin Calvin, associate professor of chemistry on the Berkeley campus, who had been collaborating with Prof. Lewis, carried the work over into photosynthesis. He found that the phosphorescent state in chlorophyll lasts for about a tenth of a second, about 10,000,000 times as long as the non-phosphorescent state retains light. Thus there is plenty of time for the conversion of this light energy into the many organic energy substances found in plants.

Dr. Michael Kasha, research fellow in chemistry, and Gus Dorouch, graduate student, assisted Dr. Calvin.

Science News Letter, February 22, 1947



CYCLOTRON MAGNET—Giant steel blocks, forged by the United States Steel Corp., are assembled to form the magnet for the University of Rochester's cyclotron, second largest cyclotron in existence. Finished, the four forgings making the base and top weigh 157 tons each, the side columns 125 tons each, and the round pole pieces 90 tons each.

RADIO

Long Distance Radio Aided

➤ LONG DISTANCE radio communications, always plagued by changing conditions in a temperamental ionosphere, may look to some improvement from a new development in the technique of bouncing radio waves off that ionized layer of the atmosphere.

Dr. M. G. Morgan, working in the Navy Electronics Research Laboratory at the University of California, has found that by rotating a transmitting antenna to a certain position he can obtain a clearer signal reflected from the ionosphere.

He explained that radio waves traveling within the ionosphere are split into two distinct components by the action of the earth's magnetic field. One of these waves is generally stronger than the other, and both register on a receiver, often resulting in garbling.

Further, the polarizations of these two signals rotate in opposite directions, and there are random changes in the strength of the two signals caused by variations in the ionosphere. These factors contribute to fading.

By rotating the antenna to a most favorable position, Dr. Morgan has found it should be possible to obtain one very strong reflected signal and one very weak one, rather than two of nearly equal volume.

The most favorable position of the antenna would vary with the conditions prevailing in the ionosphere, but it should be possible to determine this by test signals.

Thus it may be possible to build a rotating antenna which can be adjusted to prevailing conditions, Dr. Morgan says, achieving a uniformly strong signal and reducing fading and garbling which now handicap long distance radio transmission.

Dr. Morgan's finding is a result of research now being done in the Berkeley laboratory under contract with the Navy's Bureau of Ships to improve Naval communications.

Science News Letter, February 22, 1947

CHEMISTRY

Lignin Used to Purify Beet, Cane-Sugar Juices

➤ USE OF THAT Cinderella of the plant-products world, lignin, as a means for purifying beet and sugar-cane juices before concentration was developed by W. D. Nelson of Reserve, La., for patent 2,415,439. Lignin, dissolved out of bagasse or other wastes with alkali, is added to the crude juice, then coagulated with lime and heat, trapping trash and impurities.

Science News Letter, February 22, 1947

PHYSICS

Seismographs Cannot Detect Secret Atom Bomb Tests

➤ HOPES that seismographs could be used as robot detectives of unauthorized atom bomb tests have been dashed as soon as raised. Dr. B. Gutenberg of the California Institute of Technology, whose study of the seismic wave started by "Baker" explosion at Bikini last summer is cited in news dispatches as basis for such expectations, stated flatly in response to a telegraphic inquiry from Science Service, "No such use of seismographs is possible."

It is true that the far-off explosion registered itself on instruments as far east as Tucson, Ariz.; but the record is an excceedingly minute "squiggle", like hundreds of others in slightly wavy lines traced by the instruments during intervals between "earthshaker" quakes, and would have been overlooked if the exact time and distance of the explosion had not been known in advance. It is like reading a "whodunit" backwards.

A smaller-scale, shorter-range use of seismic methods for detection of military explosions was proposed early in the recent war, when ordnance men thought it might be possible to locate the positions of heavy guns by using seismograms. Seismologists, however, pointed out that all the enemy would have to do would be to fire a number of pieces in a ragged salvo, and the record would be so blurred that interpretation would be impossible.

Science News Letter, February 22, 1947

CHEMISTRY

Copper-Nicotine Compound Joins Fight Against Insects

➤ AN OIL-SOLUBLE compound of copper and nicotine, suitable for dissolving in hydrocarbons to enhance their insecticidal properties, is the chemical invention of Claude R. Smith of the Eastern Regional Research Laboratory, U. S. Department of Agriculture. Rights in his patent, No. 2,414,213, have been assigned, royalty-free, to the government.

Science News Letter, February 22, 1947

MEDICINE

Bacitracin Fights Germs

Made from germs, bacitracin clears up abscesses in a short time. It can be applied by injection or as a salve and is being prepared on pilot-plant scale.

➤ A NEW germ-fighting chemical from germs has saved 62 out of 100 patients from the surgeon's knife.

The new chemical, named bacitracin, was discovered by Dr. Frank L. Meleney and Miss Balbina Johnson of Columbia University's College of Physicians and Surgeons and the Presbyterian Hospital.

Particularly striking was the result in a dangerous abscess of the face below the lower lid near the outer side of the left eye. A red, hard area pointed in a triangular fashion toward the inner angle of the eye on the nose side. Bacitracin solution was injected into the abscess. Twenty-four hours later the pointing triangle had receded and the danger of germs invading the boy's skull and brain had passed.

Bacitracin scored another success in a patient with a deep abscess of the cheek. The abscess measured about an inch and a half in diameter. Pus was sucked out of the abscess with a needle and bacitracin injected on two successive days. On the fourth day the swelling was all gone and there was no need to cut the abscess.

Infected fingers, boils, carbuncles, styes and ulcers are among the other conditions in which bacitracin made it unnecessary for the surgeon to cut and lance, or, if surgery was needed, helped speed healing.

Both patients and doctor were often surprised by the speed and completeness of healing in some of the cases.

In the 12 cases in which results were not good, the infection had lasted long enough before treatment for a breakdown of tissue or other physiological disturbance, or the wound had become contaminated with other germs resistant to bacitracin.

Bacitracin was originally obtained from a germ from a badly infected wound in a patient who had broken the bone on the inside of his leg below his knee. Dr. Meleney and Miss Johnson found the material while looking for evidences of germ-fighting-germ action in badly infected civilian accidental wounds.

It is now being produced on a pilot-plant scale for Dr. Meleney's use on patients by the Ben Venue Laboratories at Bedford, Ohio.

So far, Dr. Meleney has used it locally, injecting it into an abscess or boil, or applying it in the form of a salve. Pilot-plant operations have now yielded the material in a form suitable for injection into muscles, as penicillin is now given, John T. Goorley, of the Ben Venue Laboratories, reported at a conference on antibiotics sponsored by the U. S. Public Service in Washington.

Science News Letter, February 22, 1947

ELECTRONICS

Electronic Tool Preserves, Sterilizes Fresh, Raw Food

➤ AN ELECTRONIC tool for sterilizing and preserving foods in their "fresh, raw state," is announced by Drs. Arno Brasch and Wolfgang Huber, of the research laboratories of Electronized Chemicals Corporation, New York, in *Science* (Jan. 31).

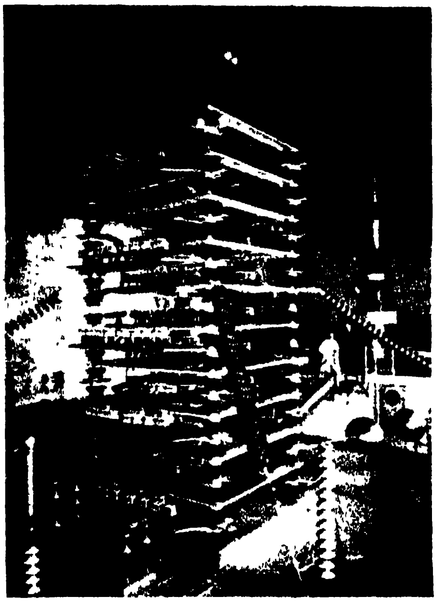
The Capacitron is the name of the device. It releases electrons during a time period of about one millionth of a second with an electronic intensity of about 30,000 to 50,000 amperes.

Medicinals, such as penicillin powder, novocaine solution and diphtheria antitoxin, and other therapeutic materials such as whole blood and plasma, were sterilized as well as foods. No change in potency or any harmful effects on the blood were observed.

Ground raw beef and fluid milk were among the foods made completely sterile, or germ-free, though they had previously been contaminated with germs.

Meat, fish, eggs, vegetables and fruits were preserved without any "deep-going" changes in taste, odor and appearance by impulse doses three to 15 times the sterilizing dose. This larger dose achieved its preserving effect by checking enzyme action, the scientists state.

"An irradiated steak," they report, "was preserved unchanged for all practical purposes after storage in the incubator at 37.5 degrees Centigrade (between 98 and 99 degrees Fahrenheit) for 12 days."



FOOD STERILIZING—The Capacitron, developed in the laboratories of the Electronized Chemicals Corporation, sterilizes and preserves food and drugs.

If the Capacitron lives up to its promise, it will be a very important development, in the opinion of other scientists who have read the first report of it.

While operating costs of the device might seem prohibitive, detailed estimates, the scientists state, show that such expenditures will not materially increase the final price of the treated product if the output of the Capacitron is adapted to the desired purpose.

Science News Letter, February 22, 1947

MINERALOGY

Rare-Earth Mineral Is Named Nuevite

➤ A NEW MINERAL, nuevite, has been christened by its discoverer, Dr. Joseph Murdoch of the University of California at Los Angeles. It is named for the town of Nuevo, Riverside County, Calif. Dr. Murdoch found the first specimen in a silica quarry near there.

Nuevite is described as a heavy, black, shiny material, containing the three rare elements yttrium, titanium and tantalum, together with iron. Although classified as a rare-earth mineral, its spectral analysis shows no uranium. Because of its scarcity, commercial uses are unlikely.

Science News Letter, February 22, 1947

MEDICINE

Jewett Nail Aids Healing Of Broken Hip Bones

➤ ELDERLY PEOPLE who suffer broken hips nowadays have a much better chance of recovering, thanks to a device known as the Jewett nail. Good results with this latest appliance were reported by Drs. Mather Cleveland, David M. Bosworth and Frederick R. Thompson of New York City at the meeting of the American Academy of Orthopaedic Surgeons.

Mortality, formerly about 40%, has been reduced to about 12%, and the broken bone has been prevented from healing crookedly so the person has difficulty walking.

The Jewett nail is a combination of a three-flanged nail and bone plate all in one piece. It is screwed firmly to the shattered bone after it has been put back into normal position by an operation.

No traction is necessary after the operation. The elderly patients can turn in bed and so do not develop bed sores. Very few developed severe mental disease, though previously about 11% had to be transferred to mental institutions because of the severe psychotic state which developed.

The time the patient must stay in the hospital has been cut to almost half and the cost to the patient has been equally reduced. When these broken hips in elderly patients were treated by traction, before development of the Jewett nail, they had to remain in bed as long as 14 weeks.

Broken hips, or fractures of the neck of the femur (thigh bone), are traditionally the fractures of old people but they are also often sustained by persons in the prime of life.

Science News Letter, February 22, 1947

MINERALOGY

Golden Fleece of Jason Probably Was Sheepskin

➤ A SCIENTIST has come up with an explanation of the mythical Golden Fleece of Jason.

Prof. Arthur F. Taggart of the Columbia University School of Mines, writing in the *American Scientist* (Jan.), explains, "The Golden Fleece that Jason stole was probably the sheepskins used to line the bottoms of gold sluices."

He adds that the ancient sheepskin process is related to the modern flotation method, used to concentrate more than 100,000,000 tons of ore per year in the United States.

In the flotation process, small particles of different minerals are separated in an aqueous suspension, called a pulp. A froth of one mineral floats on top of the other and is overflowed or skimmed off. "Without the process," declares Prof. Taggart, "the copper, lead and zinc supplies of the country would have been more than critically short in the last war, and many less common metals and minerals would have been unavailable."

Heart of the process is the selective production of a hydrocarbon-like film on the particles in the pulp which are to be floated. The sheepskins, which were probably the basis of the ancient myth about the Golden Fleece, owed at least a part of their effectiveness as gold collectors to the natural grease they contained, Prof. Taggart points out.

Science News Letter, February 22, 1947

CHEMISTRY

Helium and Spectrometer Detect Leakage of Gases

➤ TINY LEAKAGES in systems built to hold gases are easily detected by the use of helium and a spectrometer, the American Chemical Society was told by Prof. T. I. Taylor of Columbia University at a meeting at Hunter College.

The equipment to be tested is filled with helium gas, the non-combustible American gas used in balloons and dirigibles, he said. The mass spectrometer is placed at joints which are suspected of leaking. If helium is escaping, its spectrum lines show up in the instrument. The helium used in this manner is called a tracer, and the method employed is called tracer technique.

Tracer technique is now widely coming into use in every branch of chemistry in which chemical reactions are followed in detail as they occur among isotopes. These are specially prepared atoms of peculiar weights. Recently relatively simple mass spectrometers have been developed especially for identifying isotopes rapidly and accurately.

Citing the importance of the mass spectrometer in petroleum chemistry, where it is used for rapid analysis of mixtures of many chemically similar compounds, Prof. Taylor declared that the instrument can be applied to the problems of almost any chemical process involving gases or substances that can be gasified.

Science News Letter, February 22, 1947

IN SCIEN

CHEMISTRY

Wax-Like Sticks Remove Stains From Clothes

➤ STAINS on clothes, from tea, coffee, iodine, ink, grass and other substances, are easily removed by means of two new wax-like chemical sticks recently patented. They contain a type of alcohol.

The process is simple. The fabric is laid on a clean under-cloth and sponged; then what is called the acidic stick is daubed on until no more stain appears on the under-cloth. After again rinsing the spot, the second stick, a reducing stick, is applied and the spot disappears.

The chemicals used in the wax-like sticks are based on what is known technically as polyethylene glycols. Glycol is an alcohol, but not the ordinary type. Chemically it is between ethyl alcohol and glycerine, which is also an alcohol. The acidic stick contains an acid salt of oxalic acid and tri-ethanolamine, a product made by treating ethylene with ammonia. The reducing stick contains powdered sodium bisulfite or other reducing material.

A new tarnish remover, a household article to clean silver, gold, copper, brass and other metals, is also based on the same glycols. Both stain remover and tarnish remover are developments of Carbide and Carbon Chemicals Corporation of New York.

Science News Letter, February 22, 1947

AGRICULTURE

Member of Aspirin Family Kills Tobacco Blue Mold

➤ CHEMICAL COUSINS of aspirin have proven among the best means for control of tobacco blue mold tried out by the U. S. Department of Agriculture scientists. Blue mold is a fungus disease that attacks tobacco seedlings before they reach the transplanting stage, and often destroys enormous numbers of them.

The chemicals found effective against the fungus are compounds of salicylic acid; bismuth subsalicylate, used as either a spray or a dust, gave especially good results. Aspirin is the proprietary name for another compound of the same acid—acetyl salicylic acid.

Science News Letter, February 22, 1947

FIELDS

PLANT PHYSIOLOGY

Penicillin Can't Cure Trees of Blight Diseases

➤ PENICILLIN is great stuff when used on many human diseases, including some pneumonias, but it doesn't cure sick trees.

When University of California agriculturists found that the mold chemical destroyed pear and walnut blights in test-tube experiments, they were hopeful.

Injections of commercial penicillin into blighted Bartlett pear trees and English walnut trees were made by pathologist B. A. Rudolph. The experiment failed. Evidently the sap in the trees diluted the drug too much.

Science News Letter, February 22, 1947

INVENTION

Mass-Production Ice Cubes Come Out of New Machine

➤ ICE CUBES on a mass-production basis, turned out fast enough to satisfy even the biggest and thirstiest convention crowd, are the comforting promise of a new machine on which U. S. patent 2,414,264 has been granted to Willis B. Kirkpatrick of Scarsdale, N. Y.

The cubes are frozen in compartments in a set of double-walled trays, revolving on a horizontal hollow shaft through which the freezing brine is circulated to the hollow space between the double walls. The set of trays revolves within a horizontal drum containing the raw water, dipping it up until they are filled. The trays are then covered with flat lids, to insure that the ice cubes will be turned out clear and unbulged.

The brine is kept at optimum freezing temperature until the cubes are well solidified. Then the flat lids are removed, the warmer brine is circulated around the compartments, loosening the cubes and permitting them to fall out through a chute as the machine continues to revolve. Then more water is turned into the drum, the freezing trays are refilled and lidded, freezing brine flows through the circulating system, and the process is repeated.

Science News Letter, February 22, 1947

PHYSICS

Hydrogen May Be Used In Rocket Propulsion

➤ ATOM-POWERED rockets of the future may use liquid hydrogen to translate the radiant energy of uranium into terms of propelling push, Rear Adm. William S. Parsons, Navy Director of Atomic Defense, suggested at the Founders' Day luncheon of the University of Pennsylvania. The hydrogen will not be burned as fuel, but merely will be converted back into gas, which will be heated to incandescence and expelled through the nozzles at tremendous velocity. Outside, it will of course unite with atmospheric oxygen, giving the rocket a flaming tail; but this will not add anything to the propelling power.

This mode of rocket propulsion, first suggested by Dr. Luis W. Alvarez, seems possible because of one physical law of rocket propulsion: that the lightest atoms have the highest momentum at any given temperature. Hydrogen, being the lightest of elements, would be best to use for theoretical reasons. Fortunately, practical reasons back it up: hydrogen is plentiful, cheap, easily liquefied and easily handled.

Outstanding difficulty about using atom-powered rockets, as Adm. Parsons sees it, is the terrific expense in terms of hard-to-get uranium, whenever a rocket goes astray and is not recovered.

Science News Letter, February 22, 1947

ZOOLOGY

Thirteen Frogs in Red Union Suits From Colombia

➤ THIRTEEN FROGS in red union suits, even redder than the old-fashioned ones that most of us have been wishing we had, have just arrived at Washington from the South American republic of Colombia and are comfortably established in the well-warmed reptile house of the National Zoological Park, where cold waves never come.

They were brought to Washington by Maurice K. Brady, a Washington businessman who had occasion to be in Colombia recently, and turned over to Director William M. Mann of the Zoo, who declares that they are "the reddest things I've ever seen alive." The red body color is emphasized by black spots. Although the frogs are only an inch long from nose-tip to where the tail might be if a frog had one, their vivid coloring makes them look bigger.

They live in most unfroglike fashion, Mr. Brady reports, hopping about on the open forest floor in the high jungle, where the remote treetops are so densely interwoven that no underbrush can grow on the ground. Despite their conspicuousness, they hop around perfectly freely, seeming to fear no enemy.

This may be due to the deadly poison they carry under their skins, Mr. Brady suggests; their blazing hue may be a case of what Darwin termed warning coloration.

Indians use this toxin to poison their arrow-heads and blow-gun darts. They put the frogs in the hot sun, or even on heated stones, until the luckless batrachians literally sweat poison through their skins. This the Indians carefully scrape off and save for their munitions business. Mr. Brady states that he saw a dog hit by such a poisoned blow-gun dart; the animal died very quickly.

One species of these land-going frogs, states Dr. Mann, carries its tadpoles from one pool to another. They cling to the parent's body during such migrations like a lot of bright-hued little flags.

Science News Letter, February 22, 1947

CHEMISTRY

New Nitrogen Fertilizer Is Insoluble Resin

➤ WAR-CAUSED famine in Europe is focusing attention on problems of production of food, and of fertilizer that helps make food. Timely interest thus attaches to a new kind of nitrogen-containing fertilizer, covered by U. S. patent 2,415,705.

One difficulty with all nitrogen fertilizers now in use is their high solubility, which permits rain or irrigation water to leach them out of the soil very rapidly. A water-insoluble fertilizer, in which the nitrogen is still available to plant roots, has long been a great desideratum among agronomists.

This problem has been met by L. V. Rohner of Syracuse and A. P. Wood of Geddes, N. Y., who make a water-insoluble resin by compounding urea and formaldehyde, adding ammonium nitrate (another high-nitrogen compound) during the process to bring the mixture to a desired degree of acidity. After washing and drying, the resulting resin is finely ground and bagged for shipment. Patent rights have been assigned to the Solvay Process Company.

Science News Letter, February 22, 1947

ASTRONOMY

With March Comes Spring

The sun, creeping northwards, will reach its half-way point on March 21. Early in the evening, Virgo, the virgin, and Bootes, the bear driver, are seen in the east.

By JAMES STOKLEY

➤ TO THOSE of us who live in the northern hemisphere, March is always welcome because it marks the beginning of spring. Ever since December the sun has been creeping northwards among the stars and now it reaches the half-way point. Each year this position, called the vernal equinox, is reached at a slightly different time. In 1947 it comes on March 21, at 6:13 a.m., EST. Of course, as the sun moves to the north in this part of the world, it gets higher in the sky, but this puts it lower for the southern hemisphere. Hence, instead of marking the beginning of spring, March 21, in South America, Australia, South Africa, etc, is the beginning of autumn.

Like other times of year, the evening skies now have their characteristic aspect. Orion, Gemini, Taurus, Canis Major and Minor and the other constellations that were so prominent in the evening skies of winter, though still visible, are seen well to the west and set considerably earlier than they did in January. On the other hand, Virgo, the virgin, and Bootes, the bear driver, are seen in the east early in the evening. The big dipper, in Ursa Major, the great bear, is swinging high into the northeast.

Shown on Maps

These are all shown on the accompanying maps, which depict the heavens as at 10 p.m., your own standard time, about March 1 and an hour earlier at the middle of the month.

Still the brightest star shown is Sirius, the dog star, in Canis Major, in the south and slightly to the west. Higher and farther west is Orion, the warrior, with bright Betelgeuse and Rigel. Directly west is Taurus, the bull, with ruddy Aldebaran. Next to Taurus, to the right, is Auriga, the charioteer, with first magnitude Capella.

Above Orion we see the twins, Gemini, with Castor and Pollux. The latter is of the first magnitude, and the former a little fainter. Below Gemini is Canis Minor, the lesser dog, with Procyon.

In the southeast is Virgo, the virgin, with Spica near the horizon, and above it Leo, the lion, in which Regulus shines, at the end of the handle of a subgroup called the Sickle.

Cancer, the Crab

Between the sickle and Gemini is the constellation of Cancer, the crab, which is not ordinarily very conspicuous but is made so in March by the presence of the planet Saturn, brighter than any of the stars with the exception of Sirius. Saturn is almost in line with Castor and Pollux, which helps to identify it.

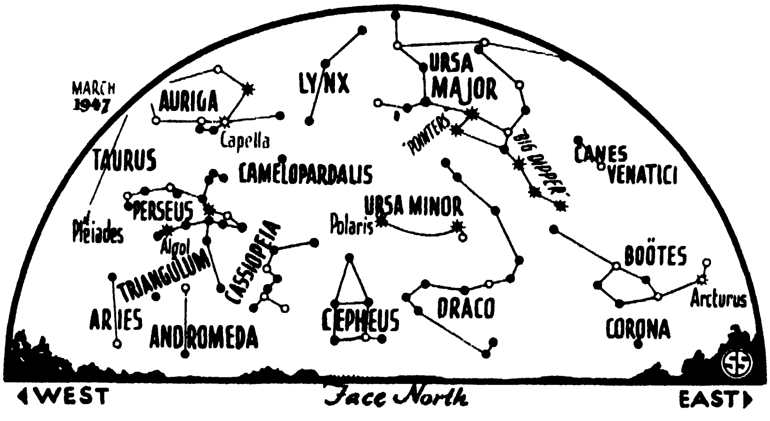
Low in the northeast Bootes, already mentioned, is seen, and it contains another star of the first magnitude, Arcturus by name. In the northwest is seen Perseus, the champion, in which can be found the famous variable star Algol, which fades in brilliance every two days, 21 hours, as a darker companion passes in front and partially eclipses it.

Another planet besides Saturn can be seen if we wait a little later in the night. Jupiter, in Libra, the scales, rises about midnight, and is even more brilliant than Sirius. Venus, still brighter, in Capricornus, the sea-goat, is visible low in the southeast at sunrise. Mercury and Mars are not to be seen this month, because they are so nearly in line with the sun.

Early in March, on the evening of the third, the constellation of Cancer, which is now made prominent by the presence of the planet Saturn, will be even more so because the moon will also be in it. At 9:15 p.m., EST, on that evening, the moon passes to the south of the planet. It will be interesting to watch the part of the sky through which the moon moves. On March 6, it is full, and then will stand in the constellation of Virgo. Soon after this it disappears from the evening sky as it goes through the phase of last quarter, and back to new, which it reaches on the 22nd. Then it is so nearly in line with the sun that it cannot be seen, but a couple of days later, on the 24th, it will be seen as a narrow crescent low in the west. Then it will be in the constellation of Pisces, the fishes. On March 29 it reaches first quarter when it will be in Gemini. Early in the morning of March 31 it is back in Cancer, and passes Saturn again.

Six Constellations

Each month as the moon moves around the sky, ever changing in phase, it passes through the same constellations. Six of these are shown on our maps—they are Aries, the ram, Taurus, Gemini, Cancer, Leo and Virgo. It will be noticed that the only planet now visible, Saturn, is in one of these. They are constellations of the zodiac, the band through which the sun, moon and planets always move. Through the middle of this band runs the ecliptic, an imaginary line which represents the place where the plane of the earth's orbit would intersect the sky if it were an actual sphere, as it appears to be. The sun always is on this line, the moon and



planets are always close to it, and the zodiac is a band seven degrees either side.

Usually it is stated that there are 12 constellations in the zodiac. In addition to the six shown on the maps, there are Libra, the scales (in which Jupiter is seen when it rises about midnight); Scorpio, the scorpion; Sagittarius, the archer; Capricornus, the sea-goat; Aquarius, the water carrier and Pisces, the fishes. One way of remembering these is from a verse written by Dr. Isaac Watts, famous writer of hymns such as "Oh God, our help in ages past." He wrote a book on astronomy, first published in 1725, containing this rhyme, which is usually misquoted:

"The Ram, the Bull, the heavenly Twins,
And next the Crab, the Lion shines,
The Virgin, and the Scales.
The Scorpion, Archer, and Sea-Goat,
The Man that holds the Water-Pot,
And Fish with glittering tails."

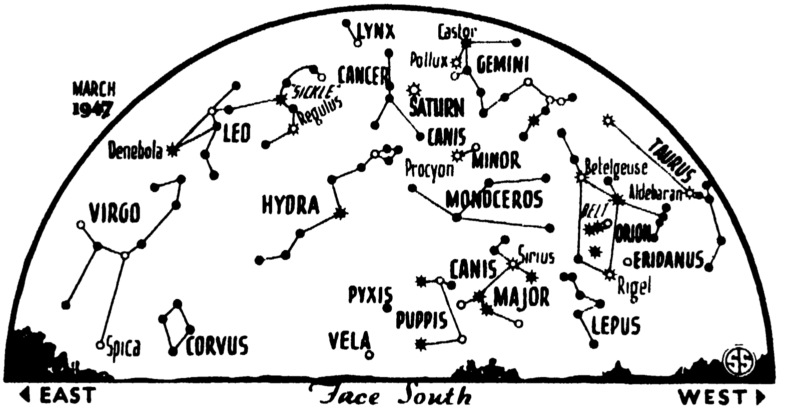
Actually, however, there are more than these 12 groups through which the moon and planets travel. For example, on March 14, when the moon is at last quarter, it will stand in the constellation of Ophiuchus, the serpent bearer. Not considered a zodiacal group, this figure really comprises more of that band than does the scorpion, which is next to it. Also parts of Cetus, the whale; Auriga, the charioteer; Orion; Sextans, the sextant and Corvus, the crow, come into the zodiac.

Celestial Time Table for March

March.	EST	
3	3.00 p.m.	Moon nearest, 227,800 miles
	9.15 p.m.	Moon passes Saturn
6	10.15 p.m.	Full moon
8	5.00 p.m.	Mercury toward sun
12	9:56 a.m.	Moon passes Jupiter
14	1:28 p.m.	Moon in last quarter
15	12:01 a.m.	Algol at minimum
	12.00 noon	Moon farthest, 251,000 miles
17	8:50 p.m.	Algol at minimum
18	8:08 p.m.	Moon passes Venus
20	5:39 p.m.	Algol at minimum
21	6:13 a.m.	Sun crosses equator, Spring commences
22	11:34 a.m.	New moon
29	8.00 a.m.	Moon nearest, 230,000 miles
	11:15 a.m.	Moon in first quarter
30	7:00 p.m.	Neptune nearest, 2,721,000,000 miles
31	2:16 a.m.	Moon passes Saturn

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, February 22, 1947



☼ ✸ ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

AERONAUTICS

Plastic Radar Dome Has Fiber Glass Base

➤ A NEW PLASTIC substance with great impact resistance, stronger than any other yet made and lighter than aluminum, has been developed by the Cornell Aeronautical Laboratory to house radar and increase its efficiency in high-speed aircraft.

A radar dome made of this new fiber-glass reinforced plastic, developed by the laboratory's wood and plastic section under the direction of Norman E. Wahl, will be installed in the nose of an AT-126 plane around new radar equipment.

Mr. Wahl said the new plastic has special electrical properties which cut absorption of radar waves to only 3%, increasing radar efficiency in flight more than 10%. With earlier plastic radar domes as much as 18% of radar waves was lost.

This new and as yet unnamed plastic is 20% to 30% stronger than aluminum and is 4% lighter, Mr. Wahl said. It has 30 times the impact strength of other plastics and is slightly more resilient.

The new material, he explained, is a significant step in the development of a plastic suitable for aircraft construction. The biggest drawback now is its price but he believes it will be widely used to build both planes and automobiles when costs are lowered through mass production.

Science News Letter, February 22, 1947

America, which in early days was a *tea-drinking nation,* can now be said to be a coffee-drinking country; England, on the other hand, switched from coffee, and its famed coffee houses, to tea about three centuries ago.

INVENTION

Throttle Valve Keeps Car From Stalling on Red Light

➤ HAVE YOU EVER STALLED your car, on trying to start after waiting through a red light with your not-fully-warmed-up engine idling? If you have ever had this embarrassing experience (and who hasn't?) you will appreciate a new gadget invented by L. E. Perrine of Detroit, which he calls a thermostatic throttle stop.

The stop on your throttle, which lets just enough fuel through to idle a warm engine, isn't set right for a cold one. To remedy this, the inventor adds to the carburetor a cam-controlled throttle valve, the position of the cam being determined by the expansion or contraction of a heat-responsive bimetallic strip actuated by the heat of the engine. It is adjusted to let more fuel through when the engine has not had time to warm up properly.

Rights in the patent, No. 2,415,529, have been assigned to the General Motors Corporation.

Science News Letter, February 22, 1947

Oil from flaxseed, with melted amber added, was used by ancient Egyptians as a varnish.

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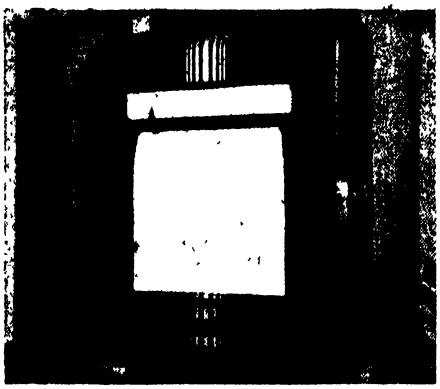
Do You Know?

By forcing certain fungicides under pressure into wood, *lumber* may be protected for many years from decay.

One-dollar federal *"duck stamps"*, which all waterfowl hunters over 16 are required to have in addition to state hunting licenses, yielded the U. S. government over $1,725,000 in 1946.

The real reason why *oysters* should not be eaten during the May-to-September season is that this is their spawning time, and summer oyster-fishing endangers future supplies.

Cheap *oxygen,* a matter of much concern in the chemical and other industries, was made in Germany by the fractional distillation of liquid air at extremely low temperatures.



Micromax Saves Observer's Time By Recording Solar Radiation

The Micromax Recorder shown above is one of two which are helping Smithsonian scientists measure solar radiation faster and more easily for the Army's tent research at Camp Lee, Va. It records radiation falling on an Eppley Pyrheliometer; the other micromax, not shown, charts fabric temperatures beneath various glass filters. These instruments save nearly all of the time which would be needed for hand plotting of the same data.

We'll be glad to send further information on request.

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LAB LIGHTNING—Students in the College of Engineering at Duke University make laboratory lightning, replete with claps of thunder. The student operating the one-half-million-volt generator is protected from stray charges by the wire screen.

GENERAL SCIENCE

Army, Navy "Poles Apart"

See Front Cover

➤ WHILE RIVAL plans for unification of our armed forces are still under hot debate in various quarters, huge forces from the Army and Navy are literally poles apart.

The Navy's big winter maneuver is the so-called Byrd Expedition, a full-fledged task force now opening up new lands in the Antarctic reaches of the Southern polar continent.

Meanwhile, the Army is studying military operations in cold weather with three task forces sent out in the opposite direction from Admiral Byrd's Little America. Army Task Force "Frigid" is battling the cold at Fairbanks, Alaska; Task Force "Williwaw" is in the Aleutian Islands; and a third cold-weather party, Task Force "Frost," is operating out of Camp McCoy, Wis. The cover of this SCIENCE NEWS LETTER shows the snow-capped mountains of the wet-cold Williwaw area in a U. S. Army Signal Corps photograph.

Actually, the Army and Navy are not so far apart. Both services are conducting determined tests to see how men and equipment stand up under cold. The Army has representatives with the Navy Force in the Antarctic, and Navy ships last year made at least two unprecedented thrusts in the cold northern waters of the Atlantic.

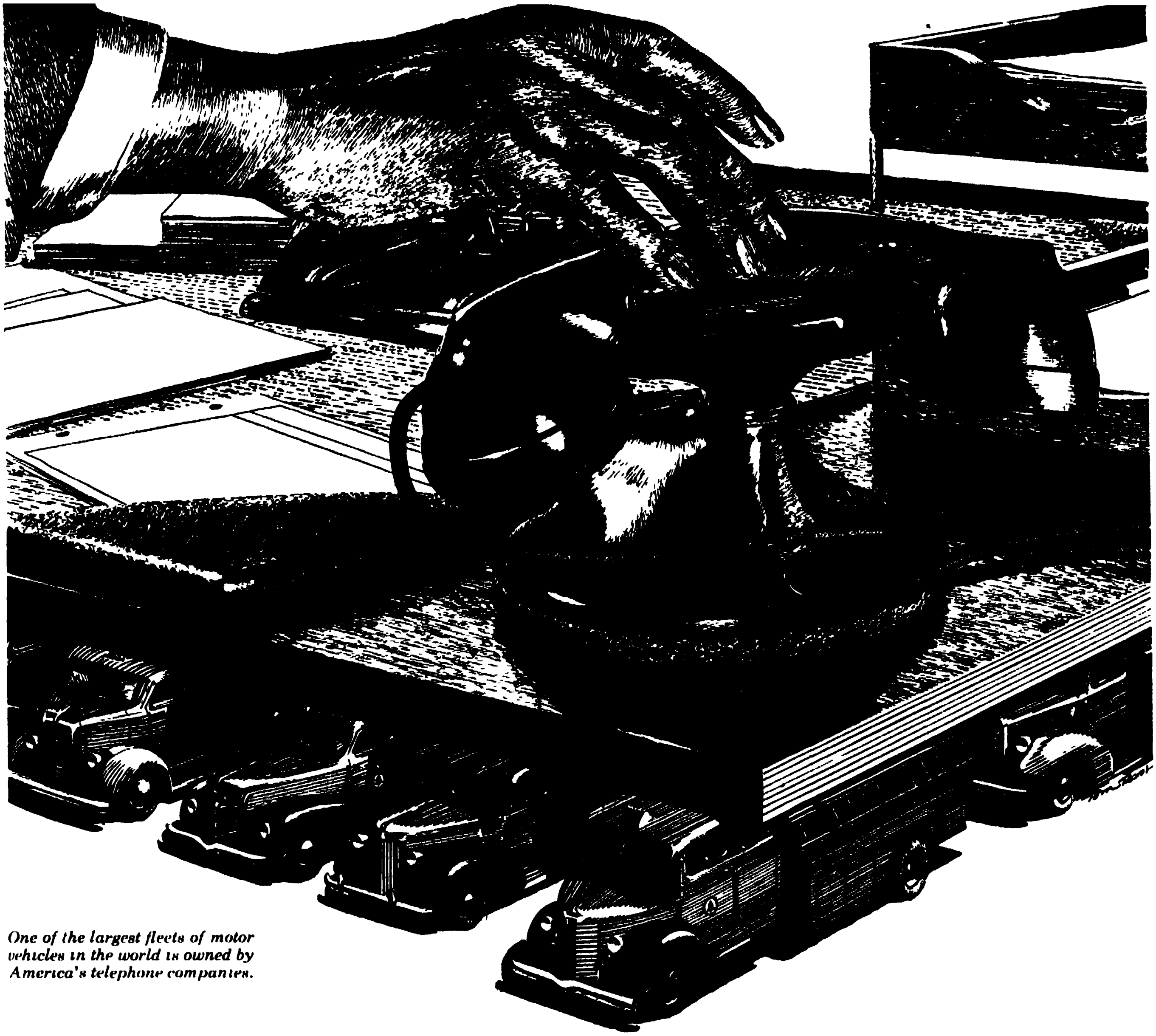
Unified or apart, the Army and Navy are making up for lost time—lost in winning World War II. There were operations in the snow for Army troops at Ardennes and in the Aleutians, and Navy ships and sailors braved some cold weather in the north Atlantic. But most of World War II was fought in temperate or even tropical climates.

Both services are acutely aware of the need for experience and equipment for operating in cold weather. Armed forces in an atomic age must be prepared to operate in any climate, military leaders believe.

Most sensational aspect of the cold weather operations is the discovery of new, unknown lands in the Antarctic by the Navy Task Force. Yet the Navy's primary purpose is that of the Army in Alaska and elsewhere in the North: training men and testing equipment.

These task forces, in some of the coldest weather on the face of the earth, are helping give the U. S. an all-weather Army and Navy.

Science News Letter, February 22, 1947



One of the largest fleets of motor vehicles in the world is owned by America's telephone companies.

Your telephone call rides on gasoline

YOU'RE used to thinking of a telephone call as a matter of wires and cables and switchboards. But did you ever consider how many cars, trucks, and trailers go into each call? Day and night, in all kinds of weather, gasoline motor vehicles are helping to maintain telephone lines, carrying repair crews, hauling telephone poles and other equipment.

Thus, each improvement in gasoline transportation has helped to improve telephone service—a service which today is the best in the world, in spite of current shortage conditions.

Improvements in gasoline during the past twenty years have been frequent. As refiners developed new refining processes and made greater use of Ethyl brand antiknock compound, the octane rating of gasoline has steadily climbed. Better gasoline, in turn, has made possible better engines—more efficient and economical gasoline transportation.

This trend to improved fuels and better engines has by no means reached its end. As current "reconversion" difficulties are overcome, petroleum refiners look forward to gasoline better than anything ever marketed in the past. Automotive engineers look forward to producing engines to utilize the future gasoline. And we of Ethyl are already cooperating with both the automotive and petroleum industries in solving the technical problems of advanced gasoline power. Ethyl Corporation, Chrysler Building, New York 17, N. Y.

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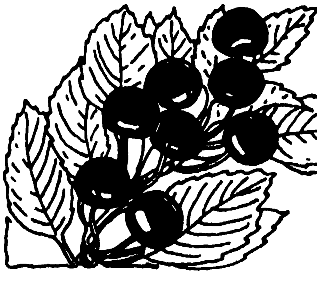
AGRICULTURE

NATURE RAMBLINGS

by Frank Thone



"Farmer George"

➤ WASHINGTON is honored as soldier, statesman, engineer, city planner. Washington thought of himself primarily as a farmer. When he was at Mount Vernon he was happy; during all the many years he had to be away from that beautiful riverside estate his chief longing was to get back home and busy himself with management of the land and improvement of its production. "Farmer George" was a nickname his enemies tossed at him, but for Washington there was no sting in the epithet: farmer he was, and proud of it. His very name, George, is the Greek word that means a farmer.

Yet most of us, if we were suddenly to be asked what Washington did on his farm, or for American farming in general, would be stumped. We know one unauthentic legend about a destructive adventure in an orchard at an early period of his life. But few of us ever get to hear of the many trees he had a hand in setting out, or of the fields whose fertility he strove to improve by crop rotation and better cultivation methods.

To anyone who goes there with land use uppermost in his mind, a visit to Mount Vernon is a revelation. It is a gentleman's house, but Washington was by no means what we think of when we use the somewhat derogatory phrase, "gentleman farmer." Farming is a business, a business that Washington knew. He made money at it, as his carefully-kept account-books still show. He aimed to improve himself in it: the bookcases still contain agricultural reference books and bound volumes of such farm journals as were available in his day. He was constantly improving the home ground; it is not unlikely that some of the old box bushes and at least two Lebanon cedars at Mount Vernon were planted by his farm-hands under his personal direction.

There is one homely anecdote (not of Parson Weems' telling!) that shows how Washington was able to do a real public service and at the same time make it pay for itself. Finding that the town of Alexandria (metropolis of the Potomac shore in his day) was ill supplied with fresh vegetables, he devoted a few acres at Mount Vernon to raising garden truck, and once a week sent to town a cart loaded with the produce. Farmer George was a practical soul.

Science News Letter, February 22, 1947

YOUR

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TEXTILES

Electricity Scattered Southern Cotton Mills

➤ COTTON MILLS in the South are more widely scattered than earlier in their history, due to the availability of electricity for power and of electrically operated air-conditioners that insure proper humidity, the American Institute of Engineers was told by J. D. McConnell of the Proximity Manufacturing Company, Greensboro, N. C.

The record of change and growth in the textile industry, particularly in the South, is closely tied to electric power. The first cotton mills were located on water power sites, both to be within mechanical transmission distance and in humidity conditions necessary in the proper processing of this material.

Science News Letter, February 22, 1947

PUBLIC HEALTH

Americans to Get More Sanitary Food in Future

➤ CLEANER, purer food for Americans in future is foreseen by U. S. Food and Drug Commissioner Paul B. Dunbar.

Food factories and warehouses will be more sanitary, he predicts, as a result of organized industry's efforts to bar insects, rats, mice and other sources of dirt and disease germs from their plants.

"The courts are not disposed to countenance the shipment of filthy food, insanitary factories or practices, or failure to protect sound food through storage negligence," he declared in his annual report to the President and Congress.

"The year 1946 saw the largest number of substantial penalties levied in the history of Federal food law enforcement. Six jail sentences and 32 fines of from $1,000 to $4,000 were imposed and 24 injunctions were granted to restrain further traffic in unfit food, either permanently or temporarily while corrections of objectionable conditions were in progress. Nine other injunctions are awaiting court hearing."

Actions to remove filthy and decomposed foods from the market involved nearly 70% of all food seizures in 1946.

Science News Letter, February 22, 1947

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Books of the Week •

ANNUAL REPORT OF THE SECRETARY OF THE INTERIOR—J. A. Krug—*U. S. Govt. Printing Office,* 448 p., paper, $1. Problems of natural resource management and development.

BUILDING CODE REQUIREMENTS FOR NEW DWELLING CONSTRUCTION; Building Materials and Structures Report BMS107—National Bureau of Standards—*U. S. Govt. Printing Office,* 43 p. paper, 20 cents.

CASEY JONES CYCLOPEDIA OF AVIATION TERMS—Arr. by Henry Lionel Williams—*McGraw-Hill,* 246 p., illus., $5. Prepared under the supervision of Aviation Research Associates.

DOMESTIC GEESE AND DUCKS—Paul Ives—*Orange Judd,* 372 p, illus., $3.50. Discussion of problems connected with raising geese and ducks for student and practical breeder.

ELECTRICAL ENGINEERING; Essential Theory and Typical Applications—Fred H. Pumphrey—*Prentice-Hall,* 369 p, illus., $5.35. A text for students specializing in other fields.

ELECTRONS, ATOMS, MOLECULES—Albert Cushing Crehore—*Christopher,* 133 p., illus., $3.75. New conception of forms of atoms in their steady states supported by calculations.

FLOWERS—William Alphonso Murrill—*Published by the author,* 120 p., illus., $3. A simple guide to wild flower recognition.

HUMAN DESTINY—Lecomte du Nouy—*Longmans,* 289 p., $3.50. A scientist presents a new interpretation of evolution, and expresses a startling theory of man's place in the universe.

THE JOURNAL OF GLACIOLOGY, Vol. I, No 1, January 1947—Gerald Seligman, ed.—*British Glaciological Society,* price to non-members 7s6d per issue.

MAMMALS OF EASTERN ASIA—G. H. H. Tate—*Macmillan,* 366 p, illus., $4. An introduction to animals in the East still strangers to the West.

PLASTICS AND YOU—Stephen Bass—*Eastwood-Steli,* 190 p., illus., $2.75. The story of a new fast-growing industry presented in a simple readable way.

PROCEEDINGS OF THE SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS—C. Lipson, ed.—*Addison-Wesley,* Vol. IV, No. 1, 128 p., illus., $6.

REPORT OF THE COMMITTEE ON MARINE ECOLOGY AS RELATED TO PALEONTOLOGY—Div. Geology and Geography—*National Research Council,* 101 p., paper, 50 cents. The sixth report of this committee.

STUDIES OF COMPULSIVE DRINKERS: Part I Case Histories—Herman Wortis and Leonard R. Sillman; Part II. Psychological Test Results—Florence Halpern—*Hillhouse Press,* 90 p., paper, $1. Distributed by the Quarterly Journal of Studies on Alcohol.

TANKER MANUAL—John F. Summerill—*Cornell Maritime Press,* 150 p., illus., $2.75. A basic training manual for beginners and a refresher for experienced tankermen.

WHAT DO YOU KNOW ABOUT BLINDNESS?—Herbert Yahres—*Public Affairs Committee,* Pamphlet No. 124, 32 p., paper, 10 cents. How to treat the blind like human beings.

YOUR CRAFT BOOK—Louis V. Newkirk and LaVada Zutter—*Int. Textbook,* 212 p., illus., $5. A treasure-house of creative work projects for children, requiring only simple materials and tools.

Science News Letter, February 22, 1947

PHYSICS

Snow for Weather Control

➤ AIRPLANE ICING conditions over large areas, and severe hail storm activity such as prevail in parts of the Midwest, may some day be curtailed or eliminated by creating artificial snowstorms, Dr. Irving Langmuir of General Electric Laboratories told the American Physical Society.

"Undoubtedly, some climatic or weather changes would ensue from vast area seeding" with microscopic nuclei, he said, "but we are in too early a stage to speculate on that." The nuclei might be introduced by generators on the ground into the atmosphere and remain there until they produce snow.

Dr. Langmuir reported on successful experiments made in GE laboratories under his direction by Vincent J. Schaefer and Dr. Bernard Vonnegut. They have found about a dozen substances to serve as nuclei to produce snow in laboratory cold-chambers, including dry ice previously reported, of which silver iodide is the best.

Natural snowflakes contain microscopic foreign particles as nuclei. In the laboratory experiments moist air is introduced into a small commercial freezing unit and the artificial nuclei added. With dry ice, snow crystals begin to form in ten seconds and increase in size as more moisture is supplied.

Among the foreign materials, in addition to dry ice and silver iodide, successfully used in producing laboratory snow are lead iodide, iodoform, iodine crystals, apatite, nephelite, wurtzite, zincite, and certain cerium oxides.

Pointing out that a temperature of minus 31 degrees Fahrenheit is required for natural ice nuclei to form spontaneously, and that natural snowstorms often occur at temperatures higher than this, Dr. Langmuir said there is every reason to believe that nature often starts snowstorms with artificial nuclei.

He estimated that approximately 200 pounds of silver iodide might prove sufficient to seed the entire atmosphere of the United States at the rate of 100,000 nuclei per cubic foot. "About one pound of silver iodide per hour of additional seeding probably would be required to maintain this condition," he said.

Science News Letter, February 22, 1947

One important method of making *chlorine* is as a co-product in the manufacture of caustic soda from salt by the electrolytic process.

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Science News Letter, February 22, 1947

SMALL switching locomotive, developed in Germany, gives extra adhesion to the rails by jacks located at both ends. The end of the locomotive is driven under the end of a car to be moved, and the jack raised until the engine is carrying a considerable portion of the weight of the car.

Science News Letter, February 22, 1947

CLOSE-UP attachment, for amateur movie-makers using eight- or 16-millimeter film, is a unit with one auxiliary lens and a compensating viewfinder. Easily fastened to the camera lens, the device gives accurate framing and needle-sharp focussing at distances as short as six inches.

Science News Letter, February 22, 1947

LIMB-LOPPER for trimming trees has a hooked upper end to pass over the branch, and a cutting edge operated by compressed air when a push-button valve is opened. The 10-foot aluminum tool weighs less than nine pounds and will cut a limb nearly an inch thick.

Science News Letter, February 22, 1947

MODERN MOTOR for shop or home, one-quarter horsepower capacity, is about one-third the size and weight of its 43-year-old ancestor. The enclosed housing of the new motor, as can be seen from the picture, protects the rotary parts from dust and grit.

Science News Letter, February 22, 1947

HUMAN BRAINS and other specimens for use in physiology classes may be kept for two years in a transparent plastic wrapping, through which they are easily studied. The specimen, removed from a formaldehyde solution, is sealed within the covering; a plastic ruler beneath protects the tissue from the sealing iron.

Science News Letter, February 22, 1947

MOTION PICTURE camera, now electrically driven, enables tourists and others to use 16-millimeter film without having to wind up a spring. Complete with battery, the unit weighs less than six pounds. Its special lightweight battery will run at least 20 magazines of film.

Science News Letter, February 22, 1947

WALKING FRAME for orthopedic patients is a stall-like affair made of tubing with casters on its four legs. The invalid walker, within the frame, grasps the upper side pieces with his hands, and carries part of his weight by adjustable crutches extending from his armpits to the frame.

Science News Letter, February 22, 1947

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W. Washington 6, D. C., and ask for Gadget Bulletin 350. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.*

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Question Box

ASTRONOMY

What danger is being lessened for polar explorers? p. 116.

When is the spring equinox? p. 122.

ELECTRONICS

How does the Capacitron preserve food? p. 119.

ENGINEERING

For what is Panama soil to be tested? p. 114.

HORTICULTURE

What is threatening citrus trees? p. 114.

MEDICINE

What saves patients from the surgeon's knife? p. 119.

MINERALOGY

What was the Golden Fleece of Jason? p. 120.

PHYSICS

Can seismographs detect atom bomb tests? p. 118.

How can artificial snow control weather? p. 127.

What theoretical and practical reasons make hydrogen usable for rocket propulsion? p. 121.

PLANT PHYSIOLOGY

How does chlorophyll retain light? p. 117.

Why can't penicillin cure sick trees? p. 121.

TEXTILES

How did electricity scatter cotton mills in the south? p. 126.

VETERINARY MEDICINE

What is being done to stop foot-and-mouth disease? p. 115.

Where published sources are used they are cited.

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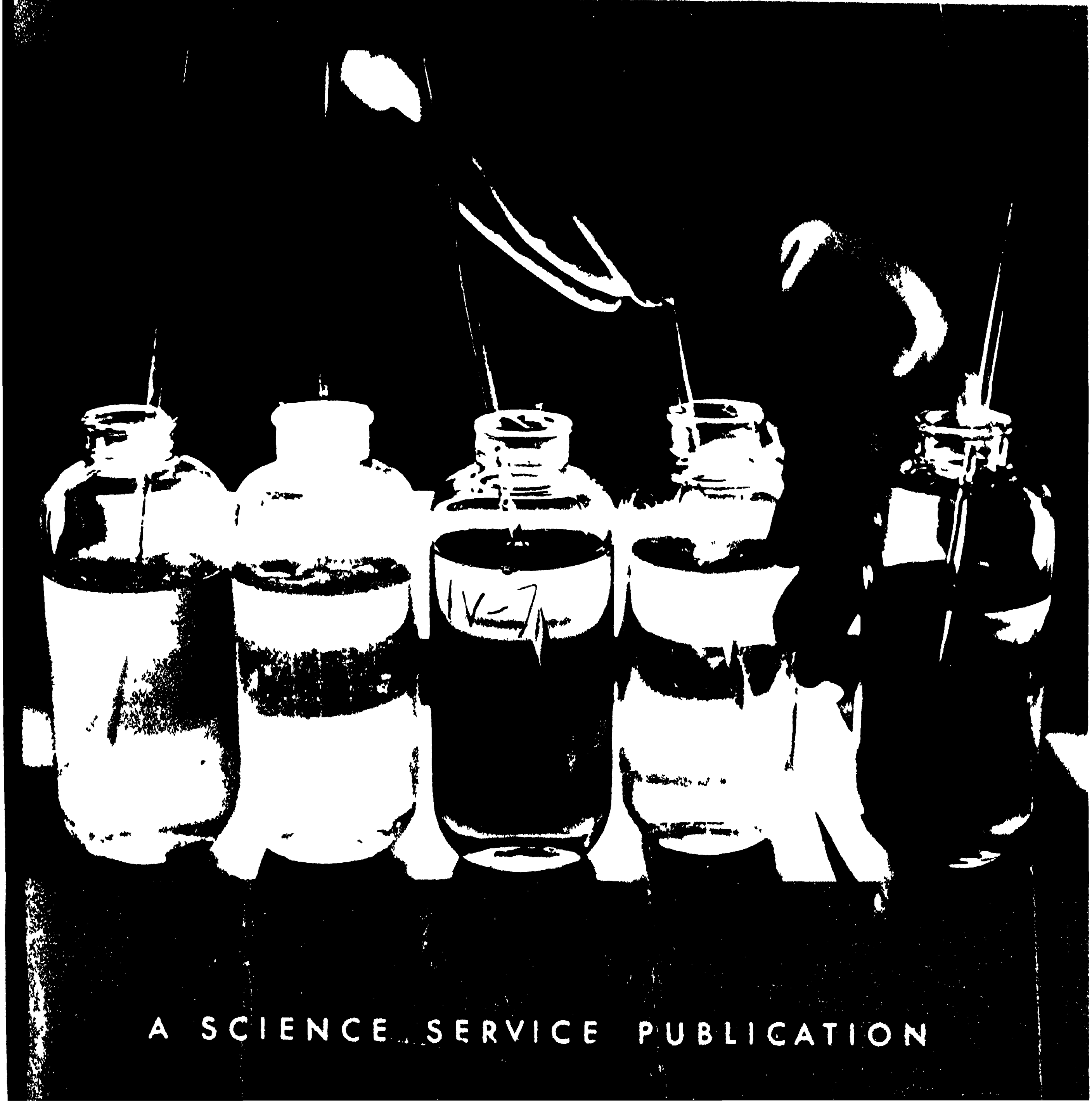

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GEOGRAPHY

Antarctic Hot Spot

Antarctica's recently-discovered warm area with never-freezing lakes of strange colors is duplicated here in the U. S. Other hot springs areas are in the Far North.

➤ ANTARCTICA'S new-found "Shangri-La", with the strangely-colored, never-freezing lakes reported by Adm. Byrd's explorers, is by no means the world's first-known spot kept free of snow and ice through polar weather by the warmth of thermal waters.

Yellowstone National Park, right here at home, has several such areas. Temperatures on the Park plateau drop to the truly Arctic levels of 60 and more below zero, yet the various geyser and hot-springs areas not only remain snow-free, but green grass and small shrubs grow along the banks of the warm streams that flow from them. There is enough of such natural hot-house vegetation to maintain a few elk in the upper geyser basin when all the rest of the herd has migrated to the lower-level winter pastures. Hot springs on the shore of Lake Yellowstone maintain an ice-free zone for yards off shore, where overwintering little flocks of pelicans and seagulls manage to pick up a living. And the strange colors reported from the Antarctic can be duplicated in Yellowstone's warm pools and weird mud geysers.

The same story can be repeated, with variations, of hot-springs areas in the Far North. There are hot springs and natural steam vents on the Alaskan mainland, among the volcanoes that rise on the Aleutian chain like knuckles on a long finger, and along the shores and in the valleys of Kamchatka, the peninsula that faces Alaska from the northeast corner of Asia. All of these keep at least little areas snow-free the year round. It is even reported that the people of one small Russian settlement near the coast of Kamchatka have put a captive hot spring to work keeping a greenhouse warm, so that they may have otherwise unobtainable green vegetables.

Classic of all hotwater areas in northern lands, of course, is Iceland. That island's one major periodic hot spring, the Great Geysir was known for centuries before Yellowstone was discovered, and has given its name to all geysers everywhere. The little river on which Iceland's capital stands never freezes, and is believed to be responsible for the city's name of Reykjavik, which means "smoking creek".

None of these northern thermal areas is nearly as close to the North Pole as the new-found warm spot in Antarctica is to the South Pole. They are all below the Arctic Circle.

The one thing that all such areas have in common is association with volcanoes, either active or extinct. The steam and hot water that flow up through vents in the surface are believed to be partly from water trickling down and contacting deeply buried hot lavas or magmas, partly from steam given off by the melted rock itself.

There are more than enough evidences of volcanic activity in Antarctica to account for a thermal area like the one reported. Geologists with former expeditions have reported an abundance of volcanic rocks, and at least one of Antarctica's mountains, Erebus, has been seen several times in at least mildly active eruption.

Science News Letter, March 1, 1947

MEDICINE

Blood May Provide Cures

See Front Cover

➤ TWO NEW CHEMICALS from the blood, that doctors may use some day to cure ills, were announced by Dr. Edwin J. Cohn of Harvard, famous for his blood plasma researches.

Green, not red, was one of these blood fractions when Dr. Cohn added a copper solution to the colorless fluid as he demonstrated before Washington chemists.

Alone among the 25 known chemicals of the human blood plasma, this particular chemical binds either copper or iron firmly to itself to transport these elements through the body.

It turned a dark, brownish red when Dr. Cohn added iron instead of copper.

"It is my job to make these chemicals from the blood available," Dr. Cohn explained. "It is the task of physiologists and physicians to discover what role they play in the body and how they can be used to treat sick patients."

Already some of the blood fractions isolated and made available by Dr. Cohn and his coworkers are fighting disease:

Little children are being protected against measles by injections of one of the blood chemicals.

Sufferers from hemophilia, the hereditary bleeders' disease called the "curse of the Hapsburgs", may be helped by another.

Better treatments of anemias and other blood diseases are being explored with other blood chemicals.

The new iron-copper carrying blood chemical is known as beta one globulin, or fraction IV-7. It is one of the chemicals obtained as a sort of by-product to the war-time production of serum albumin for transfusion to the wounded. First obtained in a mixture of other blood chemicals, it has now been obtained in crystalline form as a single chemical. Dr. Bernard Koechlin, working in Dr. Cohn's laboratory, was responsible for this advance.

The other new blood chemical separates from human serum albumin as a mercury salt. This was obtained by Dr. W. P. Hughes, Jr., another of Dr. Cohn's associates at Harvard.

Science News Letter, March 1, 1947

CHEMISTRY

Chemical "Frost" Matures Cotton, Hastens Opening

➤ FAILURE of cotton bolls to open up all at the same time has been one of the main problems of cotton picking, whether by hand or machine. Noting that a light frost, sufficient to cause the leaves to fall off, also causes unopened bolls to hasten their maturity and come open, Dr. John F. Kagy and D. T. Prendergast of Long Beach, Calif., sought a chemical that would have the same effect. This they found in an organic compound known as pentachlorophenol, applied as a dilute spray. Patent 2,416,259, covering this process, has been assigned to the Dow Chemical Company.

Science News Letter, March 1, 1947

PSYCHIATRY

Man Given Nursing Bottle

Grown people have sucked on baby bottles to recall infant experiences with the result of cured insanity that was caused before the talking age.

➤ A GROWN MAN sucks for hours on a nursing bottle to recall suppressed experiences when he was a baby.

This is the latest cure for insanity.

It really works. The manic patient, "raving mad" as an ordinary person would say, regained normal behavior.

Dr. Carl A. Whitaker, Emory University psychiatrist, told the American Orthopsychiatric Association at Cincinnati of the amazing case.

The patient was a 26-year-old industrial worker whose mental sickness was the manic type. He was overexcited and overtalkative with the noisy behavior of manic patients. Every kind of psychiatric treatment, including shock therapy, had been given this patient without effect.

Then the doctors gave him a baby's nursing bottle to suck. He took it and promptly had a "most amazing explosion" of emotional and physical excitement which left him exhausted. He was given the bottle every day for a week. On the eighth day he said, "Well, I'm not a baby any more. I don't need the bottle."

Within one week he was well. Two other grown persons and several children have been helped to get over mental sickness by the use of nursing bottles, though their cases were not so dramatic.

The use of this nursing bottle method depends on the psychiatric principle that frightening experiences very early in childhood are often the cause of mental illness or breakdown later. Psychoanalysis, hypnotism and other methods are used to help the patient recall these experiences which have been buried deep in his subconscious mind. Once he has recalled them he is helped to see how they affected his life and how he can be free of the buried fear that was driving him crazy.

If the fright happened before the child was old enough to know words and talk, he would not be able later to recall the experience, Dr. Whitaker reasoned. He could not tell about the fright if he felt it before he knew the word for it. This might explain failure of patients to recover under psychiatric treatment.

So Dr. Whitaker decided to put the patient into a situation where he could relive the experience without words. Sucking to get food is one of the earliest activities in life and one associated with feelings. Use of the nursing bottle followed this line of reasoning. With its aid patients relive the feelings of fright and stress and strain of babyhood and are able to release the emotional tension these caused. With the release of the tension, they are able to shed their unconsciously babyish attitudes and to feel and behave like normal, grown persons.

Dr. Whitaker says he is coming more and more to the point of using the nursing bottle method all the time for all mentally sick patients.

He is even considering a new type of chair for patients during psychiatric interviews. The chair would be one in which the patient can curl up under a cover and in darkness to get as near as possible to the situation and feeling of a baby in its mother's womb. The position unconsciously taken by one of his grown-up patients when she was first given the nursing bottle treatment suggested this.

A little colored boy who developed epilepsy gave Dr. Whitaker one clue to the nursing-bottle method of treating insanity. The child at the age of seven stopped talking completely. At 10 years, he had gone so far back toward babyhood that he was picking up and putting into his mouth everything he could lay hands on, just as babies do when they are first learning what objects are. Observing this child suggested the use of the nursing bottle for child victims of mental illness.

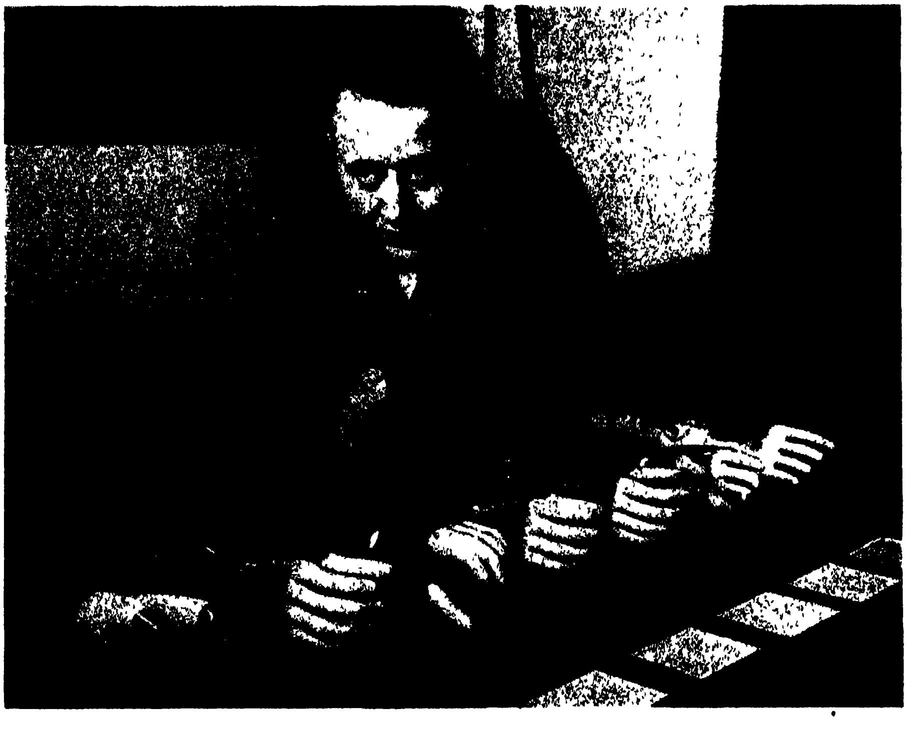
Science News Letter, March 1, 1947

PHYSICS

Radar-Like System Uses Supersonic Vibrations

➤ A RADAR-LIKE system, but using supersonic vibrations instead of radio waves, detects ships, airplanes, tanks, etc. This now-it-can-be-told wartime device is the invention of Dr. L. W. Chubb of Pittsburgh, who has assigned rights in his patent, No. 2,416,155, to the Westinghouse Electric Corporation.

Science News Letter, March 1, 1947



HOOK HAND—The new artificial hand, developed by the U. S. Army Medical Department, is shown in this U. S. Army Signal Corps photograph. It is the best that can be provided from a utility standpoint since it operates more effectively for the amputee and in addition looks like a natural hand.

Linlithgow Library

MEDICINE

Psychiatry for Epileptics

With treatment for emotional problems epileptic children have fewer fits and need less medicine. Release of emotional tension aids improvement.

➤ EPILEPTIC children have fewer fits and need less medicine when they get psychiatric treatment for their emotional problems. And they can be helped so that they will not be behavior problems or peculiar.

A treatment program achieving these results at the Baird Foundation Clinic, New York, was reported by Dr. Leopold Deutsch and Louise L. Wiener at the meeting in Cincinnati of the American Orthopsychiatric Association.

Almost half, 24 of 57 children, improved and continued to show improvement when retested after a year. Fifteen are still under treatment. Eighteen remained unimproved.

Very few of the children were mentally defective or had any organic defect of the brain structure. Most of them had the same neurotic behavior and personality disorders seen in any child guidance clinic. Some were aggressive, but as a whole the group was less destructive than most child guidance clinic patients. Play materials in the treatment room almost never had to be replaced, although with other groups of children suffering behavior disorders it was necessary to refurnish the treatment room two or three times in a similar length of time.

In some cases the epilepsy made worse the difficulties these children had in growing up, the same kind of difficulties many children without epilepsy have. In other cases, the teasing, humiliation and fear that they suffered because they were subject to fits cause the nervous or mental illness. In some cases the children were babied by parents who themselves were afraid the children were in greater danger of being run over or otherwise getting hurt because they had epilepsy.

Epileptic children seem to be afraid to show aggressiveness the way non-epileptic children do by grabbing, fighting and throwing things. They are afraid of retaliation. At the clinic they found they could be aggressive without being punished. With tension thus released, they had fewer fits, or seizures, and needed less medicine.

The outlook for epileptic children always will be better, the New York scientists believe from their experiences, when the children are given a chance for proper release of emotional tension.

Science News Letter, March 1, 1947

PALEONTOLOGY

Hunt for Man-Ape to Begin

➤ A SCIENTIFIC task force, equipped to pick the lock of what may be a most dazzling evolutionary treasure chest, is now making detailed plans to embark this summer from the University of California for South Africa.

Fragments of a man-ape, as provoking as a couple of sample doubloons to a Captain Kidd, lead the Berkeley scientists to believe that in the hard limestone caves near Johannesburg they may find an ancestor to man who could be three million years old.

Two skulls, an ankle bone, a femur and a finger bone, recovered by Dr. Robert Broom, of the Transvaal Museum, from blasting during mining operations at one of the cave deposits, are the most enticing specimens to be investigated.

The Berkeley expedition, one of the best equipped of its kind ever to be organized, will be prepared to drill into the hard limestone deposits to extricate whole specimens of the man-ape, if they exist.

They will also attempt to find evidences of fire, artifacts, fossilized seeds and leaves of plants, and skeletons of other animals. With such information it may be possible to assign the man-ape a place in the scale of man's evolution, if indeed he is an ancestor to man.

Dr. Charles L. Camp, eminent paleontologist and director of the University's Museum of Paleontology, is supervising all scientific phases of the expedition. He is a veteran of South African scientific exploration. Ten years ago he brought out of the Dark Continent what is probably the best collection of fossil reptiles ever excavated there.

Dr. Camp, who says that he has already made arrangements to work with Dr. Broom, believes a successful assignment of the man-ape's age and succession may give scientists a new starting point in man's evolution. If the specimen's are pre-man types, he says, it may be possible to trace back another step toward the ape or ape-like type from which man originated.

Success in the exploration could take scientists back to the Pliocene epoch of geological time, about three million years ago, before the glacial epoch, Dr. Camp states.

Science News Letter, March 1, 1947

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MEDICINE

Cancer Cure On Way

Many scientists are at work on problems of growth, and any day one of them may unlock the door to this secret of nature. Promising leads have already been made.

➤ A CURE for cancer will be found.

This is the considered opinion of top-flight cancer authorities given at the meeting of the National Advisory Cancer Council in Washington.

Here are the reasons:

Five promising leads to cure of cancers have already been found through physics and chemistry since 1939. They are: 1. Injection treatment with male sex hormone to relieve pain and prolong lives of elderly women with breast cancer. 2. Discovery that a chemical, urethane, brings at least temporary improvement in leukemia and other types of so-called blood cancers. 3. Discovery that the nitrogen mustard war gases give at least as good results as X-rays in treatment of some of these blood cancers. 4. Radiophosphorus for leukemia and radioiodine and other radioactive chemicals, atom bomb by-products, as potential cancer weapons. 5. Discovery that sugary chemicals from some germs can destroy cells in animals, leaving normal cells unharmed. These chemicals, now being tried on patients, are a development by American scientists that is equivalent to the much-publicized K-R anti-cancer serum of Soviet scientists.

Already one out of five men with cancer of the prostate gland are being saved from once certain death by treatment for which chemistry gave the lead and which in turn has led to the sex-hormone treatment of breast cancer in women.

Thirty out of every 100 patients with stomach cancer, third most important kind of cancer, can be cured by operation if they get to the surgeon early.

The cancer problem now is about at the point where the atom bomb was just before the uranium atom was split in 1939. Scientists had been talking about atomic power for years before then, but lacked the key to unlock it. Work toward that end, however, was going on in many laboratories. In the same way, scientists in many laboratories are now seeking a key to unlock the secrets of growth. Any day someone may learn one of these secrets which will show the way to conquest of one kind of cancer as splitting the uranium atom showed one way to unlock atomic power.

To help speed that day, the National Advisory Cancer Council recommended grants amounting to about $300,000 to support 25 studies of cancer in 18 universities, hospitals and research institutions.

Science News Letter, March 1, 1947

RADAR SCOPE—This is one of the radar scopes, shown in an Army Air Forces photograph, used by the traffic controllers of the AAF All-Weather Airline. The spots of light represent returned radar signals from permanent ground objects such as buildings and hills.

AERONAUTICS

All-Weather Line Succeeds

➤ AN ARMY AIR FORCES all-weather air line between Andrews Field, Md., and the Clinton County Air Base, Wilmington, Ohio, has proved that an airline can maintain a schedule in "zero-zero" weather.

In its first six months of operations, the airline has completed 125 round trips. Two flights were not completed but neither was grounded by the weather. One flight was unable to come to Washington because of the number of other aircraft in the Washington "stack," the traffic control system used by the Civil Aeronautics Administration there. The other grounded flight was due to hydraulic failure in the landing gear.

Actually, all flights made by the all-weather airline are in zero-zero conditions. When the sky is clear, the pilot wears blue goggles to look through a windshield covered with red polaroid glass. He is unable to see through the windshield and flies with instruments to simulate bad weather-flying.

In more than one-fifth of the flights completed by the unique airline, instrument conditions really existed, and the pilot had no need for "blind coloring" of windshield and goggles.

All the landings now are made with GCA, the ground control approach system which uses radar operators on the ground to direct pilots by radio instructions down safely.

New equipment at Wilmington which is now being installed at Andrews Field includes micro-wave early warning, MEW, a long-range warning system, and a new traffic-controlled radar, known as CPW-18. Study is now being made of static-free communicatioons for the installations.

Scheduled for early testing on the new airline is the Army's "push-button" C-54 transport plane, designed to fly completely automatically. The plane has made successful flights from its test center at Wright Field, Ohio, but it has not been used on the all-weather run.

Plans for the all-weather air line were first reported last spring in an exclusive Science Service story. Flight operations between Andrews Field and the Ohio base began Aug. 1, after early plans for a transcontinental run were found to be less economical.

Using Douglas C-54 Skymasters, the airline has successfully maintained a schedule of round trips five days a week since then. The airline's primary job is to serve as a testing ground for all-weather flying equipment—and to prove that schedules can be maintained without regard to weather conditions.

Certain Army air safety requirements have been waived to operate the line, but pilots must hold a green instrument certificate gained with more than 1,500 hours' flying time and a minimum of 100 hours of flying under actual instrument time. Pilots flying the run must have completed 50 landings with GCA.

Science News Letter, March 1, 1947

ENGINEERING

High Sky Brought in Lab

Two supersonic wind tunnels are being constructed to imitate conditions in the 90-mile mystery belt of the sky. Supersonic speeds will be studied.

➤ A STRIP of the sky from 100 miles overhead will be brought down into the laboratories of the University of California.

Two new supersonic wind tunnels under construction will create conditions in a 90-mile mystery belt of the sky from altitudes of 50,000 feet to 100 miles for studies of high-speed flight.

Jet powered, the two tunnels are being built with funds provided by the Office of Naval Research. A pilot model will duplicate conditions up to 70,000 feet, while a larger tunnel, three inches square, will test models in conditions up to 50 miles high and at speeds five times as great as the approximately 760-miles-per-hour speed of sound.

Streams of molecules fired at models by a yet-to-be-designed molecular beam apparatus will create conditions found from 50 to 100 miles overhead.

The new tunnels are based on war-developed vacuum and jet propulsion principles. Instead of the conventional blowers of wind tunnels at or near sea level conditions, the high-altitude, supersonic tunnels will be powered by a steam jet vacuum pump, the most suitable device for handling the required large volumes of air at low pressures.

The part of the sky to be studied in the laboratory with the new wind tunnels is the mystery belt of space. Scientists have well-developed physical laws for conditions up to 50,000 feet high, and the influence of temperature and other conditions on atoms and molecules above 100 miles has been determined fairly well.

But the region in between is largely a mystery as far as the principles of fluid flow at supersonic speeds are concerned. This problem of flight at high speeds and high altitude is to be tackled with the new wind tunnels.

Dr. R. G. Folsom and E. D. Kane of the University of California School of Engineering are in charge of the project.

Mr. Kane explained that bringing the sky into the laboratory with the wind tunnels is more effective than firing rockets or other missiles into the upper atmosphere, because the effect of the air at high altitudes on the instruments is not known.

He said the mysteries of the high-altitude regions cannot be solved by wind tunnels which operate at temperatures and air pressures at or near sea level, because there are fundamental differences in the air. One of these is the change in the number of molecules at sea level and high in the atmosphere. Molecules are much less frequent in the air at high altitudes.

First studies of supersonic speeds in the new tunnels will be made at conditions of altitudes below 50 miles. Equipment for higher altitude studies may be constructed later.

Captured German documents have disclosed that the Nazis had a wind tunnel similar to the ones being built in Berkeley. It was for testing flight conditions at speeds less than that of sound.

Science News Letter, March 1, 1947

CHEMISTRY

Lab Duster Helps Insecticide Chemists

➤ A DUSTER which can not be used to help clean the house has been developed for scientists experimenting with insecticides.

Reported to provide control of nearly all variables in dust tests, the new device was developed at the Whitemarsh Research Laboratories of the Pennsylvania Salt Company to study insecticide and fungicide dusts.

A modified laboratory model tower is used in the duster with a new distributor which completely breaks up dust shot into the tower. Exact measurements of the air pressure and amount of air used in shooting the dust into the tower are possible.

From tests in the duster, scientists can determine the type of deposit from a sample, drifting rate of settle, ability of dusts to stick to plants and proper size of particles for insecticidal properties.

Science News Letter, March 1, 1947

TESTING TOWER—Duster, tower, and dust distributor are shown in this photograph from the Pennsylvania Salt Manufacturing Company.

CHEMISTRY

Treated Soybean Oil Rivals Linseed Oil in Paint Field

➤ LINSEED OIL now has a new rival in the paint field. It is a chemically treated soybean oil which has similar drying qualities. Linseed oil, for many years, has been the base for paints and linoleum.

The discovery of this process of treating soybean oil to make it suitable for use in paints will free America from reliance on imports of linseed oil, or the flaxseed from which it is obtained, the American Chemical Society meeting in Pittsburgh was told by Dr. Alexander Schwarcman of Buffalo. The United States, now producing annually over 1,000,000,000 pounds of soybean oil, can produce as much as needed to supply the demands of this new use.

Castor oil also can now be used in paints, he said, as a substitute for tung oil, most of which is imported. It must be first treated, however. The treatment process is a dehydration that causes the castor oil to have fine drying properties.

About a billion pounds of linseed oil are consumed annually in the United States, one-half of which is imported, mostly from Argentina. It is used entirely for paint, varnishes, linoleum, and allied products. Castor oil is used in a great variety of industries, mostly for textiles, wall sprays, lacquers and artificial leathers.

Science News Letter, March 1, 1947

MEDICINE

Hypnotic For Morbid Fear

Pentothal, a hypnotizing drug, brings on a trance that helps patients remember and tell painful experiences that aid psychiatrists in helping them.

➤ A HYPNOTIZING drug that helped soldiers recover from combat-induced mental sickness has helped a civilian patient to recover from his morbid dread of being shut up in a confined space. The case was reported by Dr. Milton Rosenbaum, of the University of Cincinnati College of Medicine at the meeting of the American Orthopsychiatric Association.

The patient was a 50-year-old man who had had a malignant disease that might recur. Ordinary psychiatric treatment might have freed this patient from his morbid fear, but only after prolonged treatment. The patient's age and precarious state of health led his doctor to use the method that had led to swift recoveries of soldier patients.

The drug used is pentothal, one of the modern sleeping medicines. Besides putting a person to sleep it can be given in a dose that will bring on a trance in which the patient is able to recall and relate memories ordinarily shut away because they are so painful.

Just remembering the painful experiences will not cure the mental illness, Dr. Rosenbaum warned. Pentothal is not magic. During the war, psychiatrists found that after pentothal had helped soldier-patients recall their painful combat experiences, the psychiatrist still had to talk to them and help them understand how the experience led to mental breakdown.

In civilian life even more skill will be needed in using pentothal. Dr. Rosenbaum pointed out that the Army psychiatrists had been through much the same experiences as their patients and so could recognize the significant things the patient talked about while under pentothal. In civilian life the psychiatrist must draw on his knowledge of causes of mental illness in general and of the patient's own background and history to recognize what is important in the things he says under pentothal.

In the case of the man with the claustrophobia, or fear of closed spaces, Dr. Rosenbaum had felt, from the first three interviews, that painful sexual experiences in childhood were probably behind the attacks of morbid fear as a grown-up. Under pentothal, the patient recalled memories that were not new. He had recalled them before. But they bore out Dr. Rosenbaum's impression of the cause of the trouble and enabled him to point out to the patient what was back of his attacks.

Science News Letter, March 1, 1947

FOOD PROCESSING

Process Removes Oxygen In Vegetable Dehydration

➤ VEGETABLES being prepared for de-hydration are customarily blanched by scalding in hot water or steam. This is done mainly to destroy enzymes that would otherwise spoil colors and flavors by oxidation. This oxidation-spoilage problem is met in a different way in a process on which U. S. patent 2,415,995 has been issued to Harold K. Derby of Berkeley, Calif.

Instead of destroying the oxidizing enzymes, he removes the oxygen without which they cannot function. This is done simply by putting the vegetables under water in a closed vessel and exhausting the air with an aspirator. After all the air has bubbled out of the vegetables, air pressure is re-admitted to the vessel, sometimes with extra air pressure added. This fills up the evacuated air spaces in their tissues with water, which is subsequently removed, along with their own natural water content, in the dehydrating process.

Rights in the patent have been assigned to F. E. Booth Company, Inc., of San Francisco.

Science News Letter, March 1, 1947

ENGINEERING

Better Fluorescent Lighting Will Reach Homes of Future

➤ HOMES of the future will be lighted by fluorescent fixtures.

One reason is because more light is provided by fluorescent lighting at the same cost for power than by conventional methods. Another is because better phosphors are now available, and also because circular, semi-circular and coiled tubes for home lamps have been developed that are decorative in appearance.

Shadow-free lighting is another feature of fluorescent tubes, according to a report to the American Chemical Society in Milwaukee by Dr. Sampson Isenberg of Chicago.

Science News Letter, March 1, 1947

TELEVISION MIRRORS—A complex optical system, developed by the American Optical Company, will produce television pictures five times larger than pre-war sets. Television images from the receiver's cathode-ray tube are enlarged by the mirror, then reflected through the correcting lens to a flat mirror which in turn reflects the focused picture onto the viewing screen.

ASTRONOMY

New Minor Planets Around Sun May Be Discovered

➤ NEW TINY planets may soon be discovered revolving around the sun between the orbits of Mars and Jupiter. The exact paths of other asteroids or minor planets may be worked out through intensive research just being inaugurated.

This wide research program for the study of minor planets is to be under the guidance of Dr. Paul Herget, director of the University of Cincinnati Observatory. A number of observatories are cooperating in this program sponsored by the American section of the International Astronomical Union.

Fifteen hundred minor planets, most of them tiny telescopic specks which can be distinguished from faint stars only by their motions, are now known. The first one, discovered in 1801, was almost 500 miles in diameter. Most of them, however, are probably less than 50 miles across.

Not many asteroids were spotted until recent years, when astronomers could use photographic plates. Before the war about 100 new minor planets were found each year.

"Some of these planets have not been observed since 1937," Dr. Herget states, "and then for only two months, when they should have been observed for three or four years in a row. Astronomers today are not even sure they can be located again."

Science News Letter, March 1, 1947

NUTRITION

Lack of Fertilizer Causes Food Shortage and Hunger

➤ FOOD SUPPLIES for the world's famished lands will be behind schedule all this year because of serious shortages in fertilizers, the International Emergency Food Council warns. This condition obtains despite the increase in commercial fertilizer production, especially in the United States, because the demand has gone up faster than the supply.

One prime difficulty is that whereas the greatest need for fertilizer exists in the war-ravaged lands of Europe, the increased supplies are largely in the United States, where the demand has also increased. Some manufacturers are reluctant to see their production routed to the areas of greatest need, instead of into markets which they know will be permanent.

Deficit of all fertilizer elements—nitrogen, potash and soluble phosphates—is estimated at 2,261,000 tons.

Perhaps the most critical shortage is in nitrogen fertilizers. This is due in considerable part to the stoppage of synthetic nitrate production in Germany, a major fertilizer source in pre-war days. Only five countries in the world have more nitrogen fertilizers than they need.

There is prospect of relief in the phosphate fertilizer field. The Council's committee on fertilizers has recommended that rock phosphates available since the beginning of the present year be placed on the unallocated list. There is some improvement also in the potash supply, though not enough as yet to be justifiable cause for optimism.

Science News Letter, March 1, 1947

EDUCATION

Afghanistan Wants Men To Teach Science, English

➤ YOUNG MEN who would like to teach science, mathematics and English in Afghanistan, the country lying between Soviet Russia and India, are being sought by the Department of State's division of international exchange of persons.

The Afghan ministry of education is seeking 31 teachers, who would be employed in Kabul, the capital, and Kandahar, the center of Afghan history and Pushtu culture. Teaching experience and college degree are required.

English has been made the required foreign language and the two American instructors already in the country can not meet the demand for teacher training.

Science News Letter, March 1, 1947

CHEMICAL ENGINEERING

Synthetic Rubber Is Made In Continuous Stream

➤ SYNTHETIC RUBBER is turned out in a continuous stream, thanks to a new process described by M. A. Youker of du Pont to the American Institute of Chemical Engineers. Latex of the synthetic neoprene is converted into a thin rubber-like film by freezing a thin, ice-mixed layer on the surface of a chilled revolving metal cylinder. This method avoids the use of chemicals and operates continuously.

Science News Letter, March 1, 1947

IN SCIEN

METEOROLOGY

New Balloon Needs No Separate Parachute

➤ SMALL RUBBER balloons are now much used for meteorological purposes, carrying radiosondes into the upper air and dropping them by parachute for possible recovery when they finally burst. L. P. Frieder of Great Neck, N. Y., and W. S. Finken of Brooklyn have obtained patent 2,415,818 on a balloon that requires no separate parachute. A ring, secured to the rubber wall near the bottom, carries the parachute shrouds. Immediately above it is a zone of thinner rubber, providing a predetermined line of rupture. When the balloon bursts along this zone, the top is thrown off and the part of the bottom held by the ring automatically turns inside out and becomes the parachute.

Science News Letter, March 1, 1947

CHEMISTRY

Metal-Coated Plastic Fabric Is Used in Homes

➤ GOLD- or silver-colored fabric, of a new type, has many decorative uses in the home. It is a metal-coated plastic fabric that has a mirror-like finish. Uses range from lamps to window shades.

The base material is a mesh that resembles ordinary wire screening with the spaces filled with a cellulose acetate film. The fiber of the mesh is saran, a well-known plastic, a compound of polyvinylidene chloride.

The mesh with acetate filler is coated on one side with a thin film of aluminum applied by a high-vacuum evaporation process. This, as well as the gold or silver color, is covered with a protective lacquer. Over the silver finish, it is a clear lacquer; a gold-colored lacquer is used for the gold finish.

Because of its mirror-like finish, the new material will be known by the trade name Miramesh. It is a product of the National Research Corporation in Boston. It can be stitched, or cemented provided the cement used does not include solvents that will attack the acetate. It is not suitable for uses where it will be subject to repeated bending because the acetate may separate, leaving the mesh bare.

Science News Letter, March 1, 1947

E FIELDS

ZOOLOGY

Uninterested Mother Loses Child—In Zoo

➤ A MOTHER who "showed absolutely no interest in her baby" has had her child taken away from her. The foster mother is a broom handle.

The case of the delinquent mother was reported by R. Marlin Perkins, director of the Lincoln Park Zoo in Chicago. The child is an unusually mature two-toed sloth, born with both eyes wide open, a full set of teeth and well-developed claws.

Wrapped in cloth, the broom gives the baby sloth something to cling to in place of its mother. The 14-ounce baby, which has a bleating cry like a tiny lamb's, is fed every two hours with an eye-dropper.

The two-toed sloth is well known to crossword puzzle fans under its Indian name, Ai.

The baby here has no name—zoo officials aren't sure whether it is a boy or girl.

Science News Letter, March 1, 1947

PLANT PATHOLOGY

Snap Beans Can Catch Disease from Gladioli

➤ IF YOU WANT to raise healthy beans, keep them away from gladioli.

Discovery that beans can catch one of their most damaging diseases, yellow mosaic, from the mosaic-mottled leaves of sick gladiolus plants is announced in *Science* (Feb. 14) by a three-man research team, Dr. F. P. McWhorter of Oregon State College, and Dr. Lytton Boyle and B. F. Dana of the U. S. Department of Agriculture.

Suspicion was first cast on gladiolus as a possible carrier of yellow bean mosaic virus by Carl Robertson of the Eugene (Ore.) Fruit Growers Association, who had noticed that the rows of beans in a field next to a mass planting of gladioli were heavily infected with yellow mosaic, while those farther off were less affected.

The three plant pathologists were at first inclined to be skeptical, partly because beans and gladioli are so widely separated in the plant kingdom; but subsequent field observations, backed by exact laboratory tests, have proven the first supposition to be correct. Only snap beans, however, get the disease from the gladioli; a parallel test planting of lima beans remained unharmed.

Since gladioli are planted in great quantities for market, especially in the Pacific Northwest, and since mosaic disease is very common in the "glad" fields, this discovery assumes considerable economic importance.

Science News Letter, March 1, 1947

CHEMISTRY

Plastics Have Many Little-Known Uses

➤ PLASTIC MATERIALS have many little-known uses ranging from water softeners and purifiers to adhesives for joining almost any types of materials, Dr. Paul O. Powers, of the Battelle Memorial Institute, Columbus, Ohio, told the American Chemical Society in Chicago. He included plastic products that are fast-drying printing inks and others that are better lubricating oils.

Plastic products, he said, are largely associated in the public mind with gadgets and bright-colored moulded articles familiar in everyday life. But plastics can be tailored by innumerable other applications because they are composed of very large molecules whose structure can be varied as desired, he explained.

A new flame spraying process makes it possible to apply a fine plastic film on an object as a protective coating without the use of the customary solvent. Usually solvents are required. They are expensive and large volumes are needed because otherwise plastics form a very thick solution.

In the flame spraying process, the finely divided powdered plastic is blown into a hot flame which softens the material and applies it to the surface to be coated. Other methods have been developed which use low-cost solvents by suspending rather than dissolving the plastic material, fusing the resin particles after application to obtain a continuous film.

Dr. Powers mentioned also plastics developed from silicon, the element present in sand, which are remarkably stable at high temperatures. He described a plastic made from fluorine, the unruly gas which has been tamed by wartime research, as characterized by high resistance not only to heat but also to solvents and chemicals of all types.

Science News Letter, March 1, 1947

AERONAUTICS

New Transports Offer More Speed, Comfort and Safety

➤ SPEED, COMFORT and greater safety are promised air travelers in new transports soon to be ready for scheduled service. Their design and operating equipment are based on lessons learned during the war, factors that helped give American planes top rating.

Among these new craft is the United Air Lines' Mainliner 300, the Douglas DC-6, the first of which will be ready for service early this summer and will quickly be followed by others. Air tests show this 56-passenger, four-engined plane to be speedy, comfortable-riding at high and low altitudes, and easy to maneuver, an important factor in safety.

Its great power is another safety factor. The four engines are Pratt and Whitney double Wasps with a total of 8,400 horsepower. They give the plane a cruising speed of 300 miles an hour, five-mile-a-minute clip, and enable it to climb rapidly, even up to an altitude of 25,000 feet. The speed is assisted by a jet thrust exhaust system, increasing it about ten miles an hour.

Another important factor in the new plane is its propeller system. The propellers are the full-feathering, reversible-pitch type, made by Hamilton. This permits the blades to be turned in their hub to present a different angle to the air, and permits also that they be reversed to decrease the speed of the plane rapidly in landing.

Electronic automatic pilot, radio altimeter, and similar war-tested apparatus are included in its equipment. Its pressurized cabin assures passengers low-altitude comfort regardless of altitude and outside temperatures.

Science News Letter, March 1, 1947

ENGINEERING

Oxide-Coated Iron Bits Hasten Steel-Cutting

➤ SQUIRTING a stream of fine iron particles coated with oxide into the flame of an oxy-hydrogen steel-cutting torch to hasten the operation is a process invented by G. M. Deming of Orange, N. J. He explains that the oxide coating prevents the particles from igniting prematurely. Rights in his patent, No. 2,415,815, are assigned to the Air Reduction Company, Inc.

Science News Letter, March 1, 1947

PHYSICS

Bell Rings Down a Century

Telephones have served America for 71 years, and on March 3, the inventor's hundredth birthday will be celebrated. The story of the invention is told here.

By A. C. MONAHAN

➤ A SCOTCHMAN by birth, an American by choice, the father of the telephone—Alexander Graham Bell—would be 100 years old on March 3, 1947, if he were alive today. By the time of his death, August 2, 1922, telephony had made gigantic forward strides from the crude instruments and methods which carried in 1876, the first spoken words ever transmitted by wire.

In the 75 years of his life, and the 46 years of telephone history, Bell found that his discovery was far more important than even he could have dreamed in earlier days. Telephones had become common household and office equipment, one could talk across the continent from Boston to San Francisco, and during his last full year of life, underwater cable lines extended to Cuba.

Telephone Expansion

Five years after his death wire conversations with Europe were established and land lines connected American cities with those of Mexico. Radio sets had become common in American homes during his life, but the radiotelephone was only in development stages.

Few, if any, dreamed then that with the radiotelephone, within such a short period of time, an American could sit in his home and talk by wire and air with his "down-under" cousin in Australia or New Zealand.

The first complete sentence was carried by wire on March 10, 1876, a year later than Bell had succeeded in transmitting sound electrically by wire. The first two-way conversation was held on October 9, 1876, over a two-mile line between Cambridgeport and Boston. During the following years, telephony improved rapidly, and new developments are taking place almost continuously.

America now has about 32,000,000 telephones. Progressive nations all over the world have modern telephone systems, but not to the per capita extent of the United States. Round-the-world conversations dramatize the world-wide extension of telephone communication. Ships at sea, planes in the air, railroad trains on the track, and moving automobiles on highways, are all within telephone communication.

End Not Reached

The end has not been reached. Telephone transmitters and receivers will become as common in cars, trucks and buses as radio receivers are today. Isolated farms also will have phones, even those that can not be reached economically by telephone wires. Where power lines exist, they can now be used for rural telephones; other isolated spots will be served by radiotelephone.

Alexander Graham Bell was not a trained scientist as the term is used today, at least not in his early life. He came to America at the age of 24 to demonstrate a visible speech system developed by his father for training the deaf to speak. He came to Boston to teach the system to the instructors in the Boston School for the Deaf.

His interest in speech may be responsible for his undertaking a "talking telegraph" system. The idea of using telegraph lines for talking was not new with him; others had the same idea. However, it is to Bell that the credit is due for discovering the way, and carrying it through to success.

FATHER OF TELEPHONES—Alexander Graham Bell in 1876, the year the telephone was patented.

Bell did not enter the world in a poverty-stricken Scottish cabin, but in a good home in Edinburgh. His father was a scholar, teacher, writer and lecturer on correct speech and elocution. His mother, a daughter of a naval surgeon, was an accomplished musician and portrait painter. Bell was a musician of modest ability, and at one time intended to make music his career. The science of speech, however, took priority over music.

Teaching Speech

In the five years in America before he developed a working telephone, Bell was engaged much of the time in teaching the visible speech system. In his spare moments, at first, he experimented with electrical currents and particularly with the thought of transmitting words over a wire.

His first idea was a harmonic telegraph instrument to send more than one Morse message over a single wire at one time. It had already been proved that musical tones could be transmitted by the make-and-break current of electricity. This led Bell to believe that developments might permit conversation transmission.

His work with the harmonic telegraph was successful, and he received a government patent on his instrument. It is not, however, a telephone instrument, but its development gave him the ideas that made telephoning possible. To transmit words he had to find a way to vary the intensity of the current as the sound waves, loud and soft, high and low, shrill and deep, vary in the way they disturb the air.

Another thought was that a single membrane, or diaphragm, somewhat similar to the eardrum, would gather the complexities of speech or sound in the air, and through its vibrations bring about vibrations in the current in the wire. These in turn would bring about vibrations in a membrane in the receiving end and create sound waves in the air.

These ideas were new; an important step in the development of the telephone had been born. Not an electrician by training, Bell studied electricity, consulted experts, visited laboratories and picked up ideas from many sources.

The idea of the familiar telephone mouthpiece to concentrate the air waves of the voice on a diaphragm came from a laboratory at the Massachusetts Institute of Technology. Experimentation with a human ear from a dead body came from a Boston doctor. Certain fundamentals on electromagnets came from Joseph Henry, then secretary of the Smithsonian Institution and a leading electrical scientist of the day. Henry was known particularly for his work in electromagnetic induction.

New Idea

In 1874, while still working on harmonic telegraphy, it occurred to Bell that one of his telegraph reeds, vibrating over its electro-magnet, would induce wave-shaped currents corresponding to its vibrations, and that several vibrating reeds would induce a complex wave shaped current that would be the result of the vibrations of all.

While working on this idea, the telephone break came. It was on June 2, 1875, that one of the reeds stuck to its electromagnet and, when plucked to free it, sent through the wire the twang of a plucked reed, a tone with overtones. Bell, fortunately, was on the receiving end and immediately recognized the significance of what he heard.

"The first Bell telephone" was the result of this experience. It did not come immediately, but was far enough advanced so that Bell applied for a patent early in 1876, and received it on March 10 that year. It was actually three days after the patent was issued that the first spoken sentence was transmitted by wire. By early June, however, improved instruments were developed and placed on display at the Philadelphia Centennial Exposition.

There the discovery was quickly appreciated. Included among the judges of scientific apparatus were Sir William Thompson of England, Joseph Henry of the Smithsonian, and several outstanding university physicists. Sir William Thompson, England's leading authority on electricity, went to Boston with Bell to learn more about the discovery. He pronounced it "the most wonderful thing in America." Four years later, nearly 50,000 Bell telephones were in use in the United States.

Science News Letter, March 1, 1947

CHEMISTRY

Enzyme Frees Phosphorus For Embryo Development

➤ A CHEMICAL "workhorse" which makes phosphorus available to the growing embryo has been discovered in research at the University of California.

This agent is an enzyme which liberates phosphorus from protein in the eggs of frogs, so that the embryo can use it in its development.

This is the first time such an enzyme has been reported. Now that the mechanism is known, scientists may find similar enzymes in higher animal forms, including man.

The research was done by Dr. Daniel Harris, formerly of the department of biochemistry at Berkeley and now at California Institute of Technology, who was studying the enzyme make-up of protoplasm. Using frog eggs, he noticed a big increase in the inorganic phosphorus content when the eggs were ground up. He traced the cause to the new enzyme, which is called phosphoprotein phosphatase.

The find may prove of immense value, in that phosphorus is essential to normal growth in all living tissue. Phosphorus is found in the nucleo-proteins, the basic substances of the cell nucleus; probably in chromosomes, heredity-determining units; and even in viruses.

The ovum is a storehouse of phosphorus, and the new research indicates that when the embryo is in need of phosphorus the enzyme pries it loose from the protein substances in which it is locked.

Science News Letter, March 1, 1947

AERONAUTICS

Small Airports to Benefit Flying of Private Planes

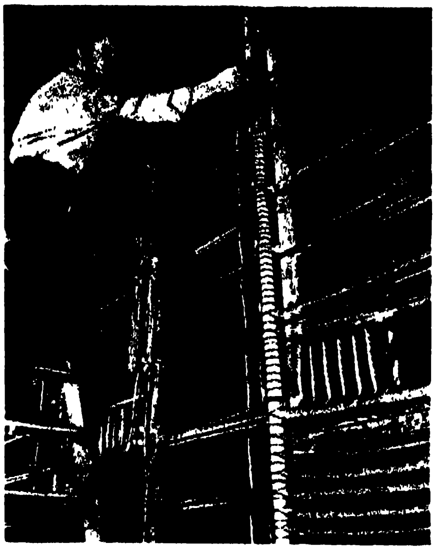
➤ PRIVATE FLYING will benefit particularly by the construction of 800 smaller airports in the United States for which federal aid has been allotted by the Civil Aeronautics Administration.

With them, flying farmers will be able to go to town by air, and city business men will be able to utilize their planes in reaching smaller centers.

During the past year some 35,000 private planes have been added by the American aircraft industry to the number already in use. Many of these will be used for business purposes, and many for family flying. The growth of private flying, for which air-minded America is now ready, depends upon the availability of local airports suitable for their use.

The federal government will contribute nearly $33,900,000 for the construction or improvement of these 800 airports. Local state or other sponsors will contribute about $37,693,000. Ports will be built in all states except Alabama. None is planned for the District of Columbia. Seventy are planned for Texas, 46 for Montana, 41 for Minnesota, 35 for Kansas, and 33 for California. In only a relatively few cases will the federal contribution per port exceed $100,000, and in some cases it will be but a few thousand.

Science News Letter, March 1, 1947



BELL'S BRAINCHILD—An important part of the telephone system, the main switching system at the Bell Telephone Laboratories duplicates every type of switching circuit in use in the telephone system today.

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Do You Know?

A living evidence of fishy ancestors is the fact that *frog* eggs hatch out into tadpoles with fins, tail and gills which in a few weeks become full-lunged, terrestrial, carnivorous quadrupeds.

Rayon laminated *plastics*, consisting of a number of layers of resin-treated fabrics pressed together into a compact plate or molded article, are used for cabinets, table tops, trays, machine parts and household utensils.

Concrete *floors*, made of standard mixtures to which about 3% of asphalt emulsion has been added, have a shock-absorbing elasticity that makes them easy on the users and does not decrease strength or durability.

Helium, the noncombustible gas used in American blimps and balloons, is now usable for aluminum welding by the so-called helium-shielded arc method used in magnesium welding, thanks to a new development.

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OCEANOGRAPHY

Dust Makes Ocean Blue

New explanation of old question was found in research on light in submarine warfare. Dust particles reflect sunlight to water surface.

➤ WHY IS the ocean blue? A new answer to this age-old question has been found in a newly reported research attempt to use light rays in anti-submarine warfare.

In attempting to find ways of combatting German submarines, two American scientists discovered that there exist in every cubic inch of clear ocean water about a million and a half dust-like particles, each about one fifty-thousandth of an inch in diameter.

These particles reflect sunlight back to the ocean surface. But the light that gets back to the surface has been filtered; water absorbs the red and yellow colors of light, leaving greens, blues and violets, the combination of which is the indigo blue common to deep ocean water.

Previously the scientific explanation for this color had been attributed to the scattering by molecules of water, just as the blue of the sky is explained by scattering due to air molecules. Less scientific explanations held that the ocean's color was a reflection of the blue sky.

The scientists, Dr. F. A. Jenkins, professor of physics at the University of California, and Dr. I. S. Bowen, now director of the Mount Wilson Observatory, conducted the research in 1941 at the U. S. Navy Electronics Laboratory in San Diego, using some of the facilities of the University of California's Scripps Institution of Oceanography.

Drs. Jenkins and Bowen found that the tiny particles played a major role in blocking their efforts to devise anti-submarine devices using light.

They found, for example, that the billions of particles suspended in the ocean, intercepting light as it passes through water, set a limit of penetration of a ray of light at a maximum of 580 feet. This limitation eliminated hopes of silhouetting submarines by dropping airplane flares below them, since it was impractical below about 200 feet.

Scattering of light by the particles also prevented bouncing light rays off submarines, similar to the use of radio waves in radar.

The same limitation was found in attempts to devise an optical proximity fuze for depth charges by installing a light projector in the nose of the projectile.

Drs. Jenkins and Bowen discovered and counted the tiny particles with an ultra-microscope, which makes it possible to see objects smaller than light waves. Light is scattered by the particles, bringing them into visibility.

Dr. Jenkins said, in explanation of colors such as green, light blue, and red near shore in shallow water, that it must be assumed some colored materials are in the water. These colored materials could include microscopic marine life.

Where non-indigo colors are found in deep water, such as the reddish brown of the Red Sea, the Gulf of California, and the green in waters such as Lake Tahoe, the explanation can be almost entirely attributed to animal and plant life.

Science News Letter, March 1, 1947

LANGUAGE IS POWER

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MEDICINE

Gas Gangrene Toxoids

➤ TOXOIDS for protection against gas gangrene, dangerous infection of deep, dirty wounds such as occur on battlefields, were ready for trial in the armed forces shortly before V-E day, Dr. Irvin S. Danielson of Lederle Laboratories revealed at the meeting of the New York Academy of Sciences.

The cessation of hostilities interrupted the trials, but previous tests on several hundred human volunteers gave results that scientists believed showed they were protected against four types of germs that produce gangrene. One of these was Clostridium perfringens which is found in 50% to 80% of gas gangrene in war wounds. Gas gangrene develops in from several percent to a fraction of one percent in war wounds, depending on the theater of operation. Mortality is high. In the central Mediterranean area it was over 60% in one series of 185 cases.

Chemical remedies and specific antiserum have not been outstanding in their ability to control the infection, Dr. Danielson pointed out. Work on development of vaccinating agents or toxoids against gas gangrene was begun in 1941, both independently and under contract with the Office of Scientific Research and Development. This work was done by scientists at the University of Cincinnati, New York University, Babies Hospital in New York, George Washington University, the National Institute of Health and the Lederle Laboratories.

As a result toxoids were developed which gave solid immunity to mice, guinea pigs, rabbits and dogs against living germs and toxins of three gas gangrene infections. These same preparations gave comparable results in the human guinea pigs.

Science News Letter, March 1, 1947

MEDICINE

Antitoxin For Diphtheria

➤ THE DIPHTHERIA patient's chance for survival depends on the day of the disease antitoxin is first given. The earlier he gets it, the better his chance for getting well, Dr. Franklin H. Top of Detroit reported to the American Public Health Association.

Cases of the severe, gravis type can be cured by antitoxin if it is given early enough and in large enough doses. Not even penicillin can take the place of antitoxin for diphtheria. The reason is that although penicillin can stop the germs in the test tube, it cannot neutralize the poison they produce. It is this poison, or toxin, that causes the symptoms and can kill the patient. Penicillin, however, may be useful in treating diphtheria patients if complications occur or if the patient has streptococcus infection at the same time.

Alum-precipitated toxoid, called APT for short, is Dr. Top's favorite weapon for preventing diphtheria, although a number of other preventive substances can be used. All babies between nine months and one year of age should get this protection, given in two injections one month to six weeks apart.

Booster doses are advised at the age of two and again before entering school for the first time because the number of cases and carriers of diphtheria is declining. This decline cuts down the chance of the child's getting a natural booster of his immunity through small doses of germs caught from carriers or patients he might come in contact with.

Science News Letter, March 1, 1947

AGRICULTURE

DDT to Halt Worms in Apples

➤ THE UNPLEASANT experience of finding a worm (or maybe only a half-worm) in an apple is due to become less frequent, as DDT spraying becomes more widely adopted by orchardists. This year, U. S. Department of Agriculture scientists state, this revolutionary insecticide will probably be used in from one-third to one-half of all American apple orchards.

Most of the so-called worms in apples are not really worms, but the larvae of the codling moth. Against this pest DDT is peculiarly effective. It has also been found deadly to a number of other fruit-damaging insects, including pear thrips, oriental fruit moth and grape leafhopper.

In the concentrations used at present, however, DDT does not kill leaf mites, woolly apple aphid and red banded leaf-roller. These even increase in abundance after DDT spraying, due partly to its effect on the predatory and parasitic insects that ordinarily hold them in check. Something will have to be done about this situation before DDT can be considered an unqualified success as an orchard spray.

Science News Letter, March 1, 1947

The place of *cancer* in the medical school curriculum is to be made more important; a national committee is planning ways by which medical students can be informed about all the latest developments in cancer treatment.

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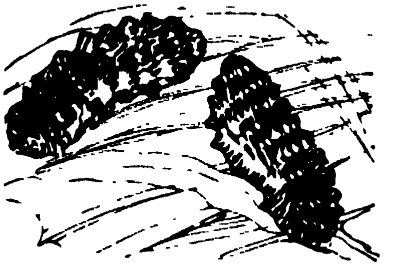
BIOLOGY

NATURE RAMBLINGS
by Frank Thone



Veterans of Winter

➤ WOOLLY-BEAR caterpillars sometimes surprise us, during spells of mild winter weather, by suddenly appearing out of nowhere, to go humpity-hump across our paths. Most of us, remembering the first (and perhaps only) nature lessons we received, think that proper caterpillars should spin themselves into cocoons in the fall, to emerge as butterflies or moths in the spring. To see a caterpillar active so long after autumn seems a contradiction of our kindergarten lesson.

It is a contradiction. We didn't learn everything in the kindergarten—least of all about nature. The teacher gave us as much as she thought we could absorb at the time; it isn't her fault if we stopped learning when she stopped teaching us. The story she gave us is true enough—for that kind of caterpillar. Woolly-bears, and a great many other kinds, have a different kind of life-history. They hatch and grow up in late summer, hide out in sheltered cracks and crannies during the winter, and go on being caterpillars for a while when warm weather comes again. Then they spin sketchy nests (hardly to be dignified as cocoons), sleep briefly as pupae, and emerge as adults.

Still other members of the butterfly-moth order live through the winter as adults, clinging motionless to bark or twigs in the woods. A familiar example is the beautiful dark-winged mourning-cloak butterfly.

What is true for members of this one order is true throughout the whole world of many-legged lesser animal life. Whole hosts of insects, spiders, etc., quietly die in autumn, leaving only their eggs to survive the winter and renew the life of their species in spring. Others endure the hard season as larvae or pupae, hidden away in the safest lurking-places they can find, and ready to complete metamorphosis into adults when the sun shines longer and more warmly each day. Still others manage to live through as adults, and are thus able to get an early start when warmth permits them to move and feed and mate again.

Science News Letter, March 1, 1947

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CHEMICAL ENGINEERING

Materials Flow Together To Give Product in Process

➤ CONTINUOUS manufacture of chemicals with two or more materials flowing together and producing some needed product is the latest method in chemical engineering.

One of the materials needed for soap is made in this way, a chemical team from Colgate-Palmolive-Peet Co., Jersey City, reported to the American Institute of Chemical Engineers meeting in Louisville, Ky. Fatty oil is pumped one direction and water another under high pressure and temperature and fatty acids and aqueous glycerol result.

A continuous method of making greases by this new and better way was reported by Dr. H. G. Houlton of Girdler Corporation of Louisville. Quality varied from batch to batch in the past, while for four years superior, uniform lubricating grease has been produced at the rate of 60 pounds a minute from each machine used.

Science News Letter, March 1, 1947

CHEMICAL ENGINEERING

Whiskey May Become Distillery By-Product

➤ WHISKEY may become a mere by-product of the distilleries.

If it does, it will be because the soluble wastes from making whiskey are worth more as feed for livestock and poultry than whiskey is as a drink. J. W. Spanyer, Jr., of the Brown-Forman Distillers Corp., told the American Institute of Chemical Engineers that that time may come.

Solids from soluble waste, a liquid left at the bottom of the stills after the whiskey and "light grain" by-product have been removed, have produced startling results as a feed. The wastes are better feed, Mr. Spanyer explained, than the original grain. "In fact," Mr. Spanyer concluded, "some of the feeding experiments conducted with this material by various universities have been so startling that one distillery official states that whiskey may eventually be the by-product of the distilling industry."

Science News Letter, March 1, 1947

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ACRES AND PEOPLE—Earley Vernon Wilcox—*Orange Judd,* 297 p., illus., $3. The problem of balancing acres and people to counteract starvation in those countries, particularly in the Orient, where a sub-marginal diet is the rule, is attacked from all angles that might contribute to its solution.

CARDIOVASCULAR DISEASES—David Scherf and Linn J. Boyd—*Lippincott,* 478 p, illus., $10. Completely rewritten and up-to-date version of a favorably received book on diseases of the heart and blood vessels which seems likely to be useful to practicing physicians.

CHARLES-EDOUARD BROWN-SEQUARD, A NINETEENTH CENTURY NEUROLOGIST AND ENDOCRINOLOGIST—J. M. D. Olmsted—*Johns Hopkins Press,* 253 p., $3. Tribute to the last in the line of a great tradition of French experimental physiology at the *College de France.*

CONCISE CHEMICAL AND TECHNICAL DICTIONARY—H. Bennett, ed.—*Chemical Pub.,* 1054 p., $10. About 50,000 definitions including every field of scientific or technical development.

ELECTRONS (+ and −) PROTONS, PHOTONS, NEUTRONS, MESOTRONS, AND COSMIC RAYS—Robert A. Millikan—*Univ of Chicago Press.,* rev. ed., 640 p., illus., $6. The discoveries in physics for the last fifty years brought up to date to include the recent discoveries of new elements in the structure of the universe; also the latest values of the electrical and radiation units.

INTERNATIONAL AGENCIES IN WHICH THE UNITED STATES GOVERNMENT PARTICIPATES, Dept. of State Publ. No. 2699, —*U. S. Govt. Printing Office,* 322 p., paper, 65 cents. A listing of those agencies devoted to international cooperation.

THE LAMINA TERMINALIS AND PREOPTIC RECESS IN AMPHIBIA—Albert M. Reese—*Smithsonian Inst.,* 9 p., 15 cents—Smithsonian Miscellaneous Collections Vol. 106, No. 19, Publication 3867.

NEW DEVELOPMENTS IN HARDWOOD PULP—Northeastern Wood Utilization Council—*Publ. by the Council,* Bulletin No. 14, 123 p., paper, $2. Report of Conference at Syracuse, N. Y., October 2, 1946

PARTICIPATION OF THE UNITED STATES GOVERNMENT IN INTERNATIONAL CONFERENCES JULY 1, 1941-JUNE 30, 1945—Dept. of State Publ. 2665, *Govt. Printing Office,* 232 p., paper, 45 cents.

PORTLAND CEMENT TECHNOLOGY—J. C. Witt—*Chemical Pub.*—518 p., illus., $10. Information on every step of cement manufacture; emphasis on materials rather than plant equipment.

THE PRODUCTION AND PROPERTIES OF PLASTICS—S. Leon Kaye—*Int. Textbook,* 612 p., illus., $5. Technical treatment of field of plastics for use as textbook and reference source.

SPLENDORS OF THE SKY—Charles and Helen Federer—*Sky Pub.,* 34 p., illus, paper, 50 cents. Excellent photographs of solar phenomena, an invitation to astronomy.

THE STORY OF HUMAN BIRTH—Alan Frank Guttmacher—*Penguin,* 214 p., illus., paper, 25 cents. This entertaining, instructive book made available at a low price, will be useful to prospective parents and others desiring accurate information simply told

SUBTROPICAL FLOW PATTERNS IN SUMMER—Herbert Riehl—*Univ. of Chicago Press,* 64 p., paper, $1.25. A publication of the Dept. of Meteorology of the University of Chicago.

THE UNITED STATES AND THE UNITED NATIONS—Report by the President to the Congress for the year 1946—Dept. of State Publ. 2735—*Govt. Printing Office.* 220 p., paper, 45 cents. The activities of the United Nations and the participation of the United States therein.

WORLD ALMANAC, *New York World-Telegram,* 912 p., paper, $1. Sections on Atomic Energy, Electronics, and a Science Review for 1946 were written by Science Service

YOUR COMMUNITY: Its Provision for Health, Education, Safety and Welfare—Joanna C. Colcord—*Russell Sage Foundation,* 3rd ed., 263 p., $1 50. A guide for community study.

Science News Letter, March 1, 1947

PSYCHOLOGY

War's Effect on Campus

➤ GIRLS WHO entered college during the war did not adjust as well to college life as those who had begun their college educations before the war broke out in 1941, Dr. Annelies A. Rose, department of psychology, Smith College, states in a report to the *Journal of Social Psychology.*

Reason for this, Dr. Rose explains, is that adolescents are just beginning to feel at ease socially and in their relations to the opposite sex when they enter college. The war halted normal social life, leaving a feeling of insecurity that carried over into social, emotional and health problems.

The teen-age girl's growth into a poised, calm, steady person was probably affected by the war. Few social activities, fewer available boys and the fear lest she miss her chance to get married were possible causes, suggests Dr. Rose.

Students who graduated in 1945 were found to be better adjusted in all ways than the girls who entered college a year after them and graduated in 1946. The class of '47, which will graduate this year, followed the same trend toward a less satisfactory adjustment.

The greatest difference in the two groups tested was emotional. Frequent spells of blues were more characteristic of the group tested in 1945. More girls in 1945 than those tested in 1944 admitted emotional excitability and lack of control. Daydreaming, a way of making up for things they wanted and did not have, showed the greatest increase from 42.3% to 70.0%.

Students in 1945 reflected wartime conditions with a definite feeling of inadequacy. A greater than average number worried about their grades, and many of these were C and B students. Dr. Rose suggests that the shortage of men and social life made grades seem unduly important to all the students.

Science News Letter, March 1, 1947

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❁ SANDPAPER, recently patented, has attached backing strips with projecting ends that can be turned upright to form a handle. The backing strips are separated from each other, and between them are lines of perforation in the sandpaper itself that permit easy tearing.

Science News Letter, March 1, 1947

❁ PLUG-IN connector for portable gas appliances is usable in homes as well as in laboratories and shops. When the plug-in fixture on the flexible tubing is pushed into an outlet plug on the gas line, a metal-to-metal gas-way seal is formed.

Science News Letter, March 1, 1947

❁ FISHING ROD made of beryllium-copper tubing is strong, springy, corrosion-proof, and can be used in either fresh or salt water. Of the telescopic type, it is 17 inches long when closed and 57 inches in length when extended.

Science News Letter, March 1, 1947

❁ HOUSEHOLD ironers of the rotary type when not in use fold up to from one-third to one-half the space needed when in operation. They have folding end shelves to store ironed clothing, and a folding lapboard to prevent damp clothes coming into contact with the floor.

Science News Letter, March 1, 1947

❁ SILICON crystal converter, for use as first detector in high frequency superheterodyne receivers, is pre-set in small cartridges as shown in the picture. Unlike vacuum tubes, it requires no filament or heater supply and takes only a fraction of the space.

Science News Letter, March 1, 1947

❁ MAGNETIC HOLDER for tooth brushes and other toilet articles is an elongated casing fastened to the wall. The holders inside are small, permanent horseshoe magnets with poles pointing outward. Articles of magnetic material placed over the magnetic poles stick to the plastic covering.

Science News Letter, March 1, 1947

❁ LIBRARY CHESTS for eight- and 16-millimeter film have a push-button control by which any particular roll of film is moved forward for easy removal. The door of the all-metal welded chest opens downward. Self-aligning stacking inside prevents rolls from falling out of position.

Science News Letter, March 1, 1947

❁ LUMINOUS TUBING, made of a flexible, tough, semi-transparent plastic that is also moisture- and acid-resistant, is coated on the inside with a radioactive material which makes it clearly visible in complete darkness for a considerable distance.

Science News Letter, March 1, 1947

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Question Box

BIOLOGY

Do woolly-bear caterpillars sleep as pupae in winter? p. 142.

CHEMISTRY

Why will soybean oil be an important substitute for linseed oil in paint? p. 134.

ENGINEERING

How will conditions of from 50 to 100 miles up be created in the new supersonic wind tunnels? p. 134.

Why will more homes of the future have fluorescent lighting? p. 135.

FOOD PROCESSING

How does a new method of dehydrating vegetables stop oxidation? p. 135.

GEOGRAPHY

What are the characteristics of Antarctica's hot spot? p. 130.

MEDICINE

How are blood chemicals fighting disease? p. 130.

What leads to cancer cure have already been made? p. 133.

OCEANOGRAPHY

What makes the ocean blue? p. 140.

PHYSICS

How did Bell hit on the idea for the invention of the telephone? p. 139.

PLANT PATHOLOGY

How can gladioli harm snap beans? p. 137.

PSYCHIATRY

How are grown people helped by sucking nursery bottles? p. 131.

Where published sources are used they are cited.

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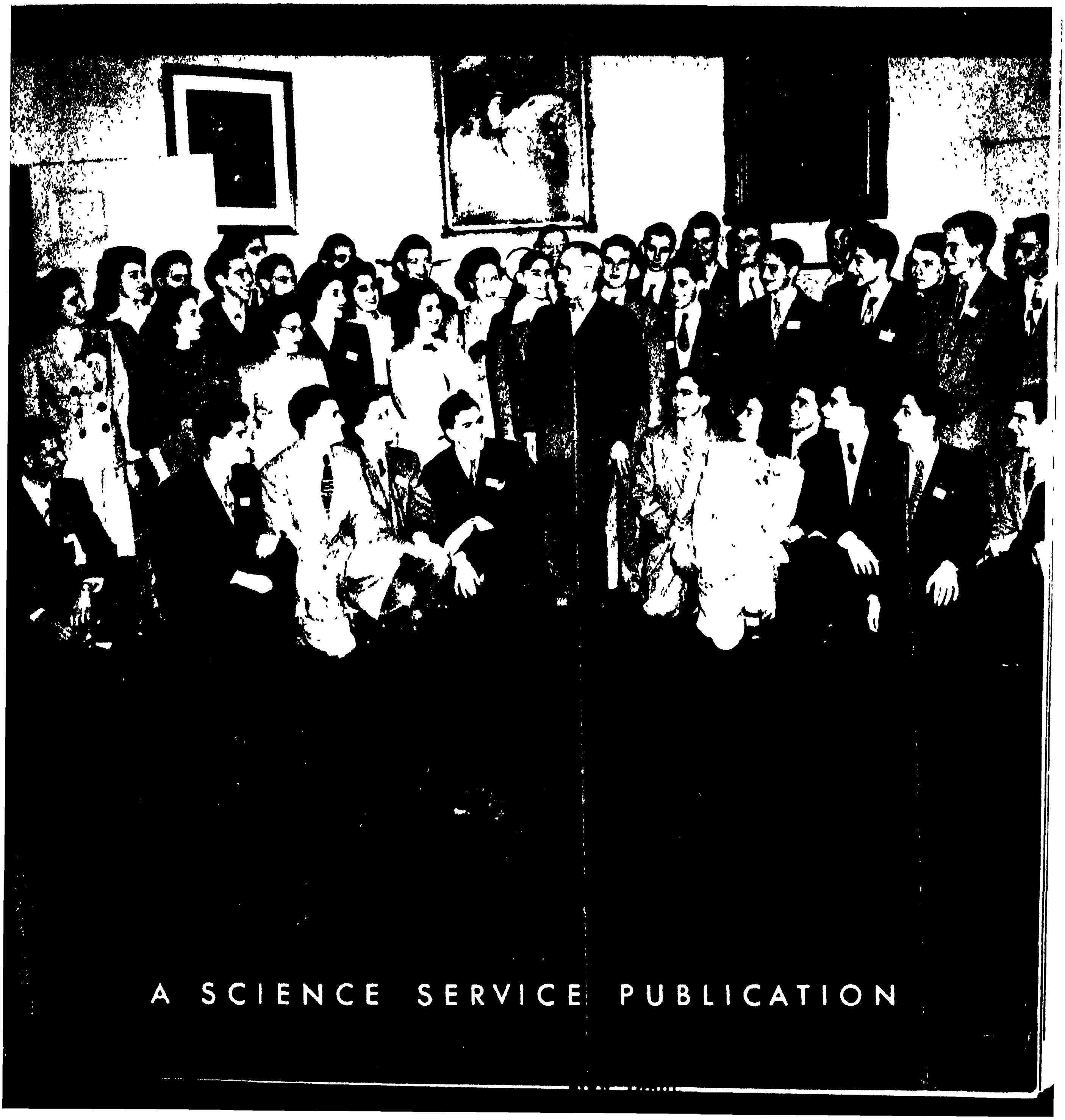

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GENERAL SCIENCE

For a Science Foundation

Intersociety committee organizes to help Congress provide for exploration of great unknowns; Cornell's President Day heads new group. House hearings start.

➤ BOTH Congress and scientists are getting set to create a national science foundation for the exploration of the world's great unknowns.

Just as science was mobilized during the war to give the military new weapons, such as the atomic bomb, it is planned to support and encourage research in universities and other laboratories to dig out the new basic knowledge for future use in peace and war.

Six bills for various kinds of science foundations are before Senate and House committees. The first hearings were scheduled for March 6 and 7 when the House Committee on Interstate and Foreign Commerce planned to devote eight hours to hearing witnesses. This is the same committee that in the last Congress failed to report on science bills in the closing days of the session and thus blocked passage of the bill that had been passed by the Senate.

Recently 120 representatives of scientific societies met in Washington and formed an intersociety committee on a national science foundation. This is the largest and most representative meeting of the sort that has been held in the history of American science.

President Edmund E. Day of Cornell was elected chairman and Dr. Harlow Shapley of Harvard was chosen vice-chairman, with Dr. Dael Wolfle of American Psychological Association as secretary-treasurer. Six executive committee members from various parts of the country, representative of various fields of science and points of view regarding foundation proposals were also chosen.

Executive committee members include the officers and President Isaiah Bowman, Johns Hopkins; Dr. Ralph W. Gerard, University of Chicago; Chancellor R. G. Gustavson, University of Nebraska; Dr. Henry Allen Moe, Guggenheim Foundation; Dr. W. Albert Noyes, Jr., University of Rochester; Dr. Douglas M. Whitaker, Stanford University.

The principal differences among scientists are concerned with how the proposed foundation should be administered. The bill that in the last Congress passed the Senate provided an administrator presidentially-appointed and Senate-confirmed, with an independent part-time advisory committee of scientists. Senator Elbert D. Thomas, D., Utah, has introduced this bill as S. 525.

A new bill introduced by Senator H. Alexander Smith, R., N. J., provided a part-time foundation membership of 48, which would appoint an executive committee of nine, which in turn would select a director and heads of the working divisions.

To provide a united front, scientists through their new committee may favor some compromise between the single administrator and the large committee. This may be a full-time commission of five along the lines of the atomic energy commission. Polls among the new intersociety committee show that a combination of those favoring a single administrator or a commission outnumber better than two to one those favoring control vested in a large committee.

Science News Letter, March 8, 1947

COMMITTEE HEADS—Dr. Harlow Shapley was elected vice-chairman of the committee; Dr. Edmund E. Day, chairman; and Dr. Dael Wolfle, secretary-treasurer.

VOLCANOLOGY

Mount Etna Eruption Threatens Sicilians

➤ MOUNT ETNA, Europe's largest volcano, has again erupted, sending rivers of molten lava down its slopes to threaten the inhabitants of Sicily.

History's original volcano, from which the name "volcano" is believed to have come, has sent lava down on the island in the Mediterranean since the days of Plato and Aristotle. With the flows, have come death, destruction and perhaps the richest soil in the world.

Sicily, at the tip of the toe of Italy's boot, boasts as many as five crops a year and some of the most famous vineyards in the world as a result of Mount Etna's sometimes dangerous flows. Other European grape areas in northern France and southern Germany are also on lava soil left by long-since-vanished volcanoes.

Because Mount Etna does not usually explode when it erupts, few lives have been lost in modern eruptions, but history records several thousand deaths for Mount Etna's flows in the years 1169 and 1669. Most recent major eruption of the volcano was in 1928.

The name "volcano" comes from Vulcan, blacksmith god of fire and metals in the belief of the ancient Greeks and Romans.

Science News Letter, March 8, 1947

PHOTOGRAPHY

One Step Makes Pictures

New camera takes and produces finished picture in one minute. Tiny pod between film and paper does darkroom work. Process may be good for motion pictures also.

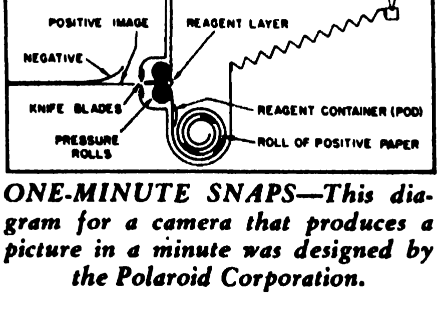
➤ TAKE A SNAPSHOT; turn a knob; and wait one minute. Then you have a finished picture with a new camera demonstrated for the first time to the Optical Society of America meeting in New York.

The camera, which can be made in the shape or size of most modern cameras, gives you a finished, dry picture and completely developed negative in one minute without tanks and darkroom, or several days or weeks of waiting to get your films back from the corner drugstore. If the picture turns out badly, you can "shoot" it again on the spot.

A tiny pod or sealed chamber between the film and photographic paper loaded in the camera does the work of the tank and trays of chemicals in a photographer's darkroom. After a picture is snapped, a knob is turned to send the sandwich of film and paper through a ringer of two small rollers on the camera.

This pressure releases a few drops of viscous chemical and spreads a moist layer between the film and paper. After one minute, you can strip away the film from the completed picture.

Chemical ingredients of the small pod include standard photographic developer, hydroquinone; fixer, sodium thiosulfate or hypo; and a viscous reagent. Each tiny container of chemicals contains enough to develop the negative and print the picture in a single-step operation in one minute.



ONE-MINUTE SNAPS—This diagram for a camera that produces a picture in a minute was designed by the Polaroid Corporation.

The new process was demonstrated by its inventor, Edwin H. Land, president and director of research of the Polaroid Corporation, Cambridge, Mass. The new cameras are not on the market yet, and Polaroid officials predicted that it will be "several months" before the new development will be available.

In addition to letting the amateur photographer see his snapshot one minute after he has taken a picture, the one-step camera will make it possible to put technical pictures to immediate use without using a darkroom.

The process, which will turn out pictures in temperatures ranging from the heat of midsummer to below freezing, can be adapted to color pictures and motion pictures, Mr. Land told the Optical Society.

In some of several one-step processes he described, the negative can be used to print other pictures, and in all of them copies can be made by photographing the print or re-photographing the scene.

Mr. Land has developed four different methods for producing a finished picture in a single operation. In his soluble silver complex process, the developer and hypo perform twin duty between the film and the paper to utilize silver from the film in printing the picture.

In addition to the developer, fixer and viscous reagent in the small pod between the film and paper, the pod or the paper has other ingredients which control the size of the silver particle to determine the color of the print, control the rates of the various reactions, prevent discoloration of the print, and make the process work in a wide range of temperatures.

Science News Letter, March 8, 1947

BIOLOGY

Dr. Ross G. Harrison Wins John J. Carty Medal

➤ DR. ROSS G. HARRISON, Yale biologist who was chairman of the National Research Council from 1938 until last year, will be given the John J. Carty medal of the National Academy of Sciences at its annual meeting in April.

Dr. Harrison will be honored in part for his researches upon the nervous system which led to tissue culture as now practiced widely in cell growth studies, and in part for his service in directing the National Research Council.

Science News Letter, March 8, 1947

Of the 12 *minerals* required in proper farm animal nutrition, some are called trace minerals because needed in very small quanties; the 12 are calcium, phosphorus, magnesium, sodium, potassium, chlorine, iodine, manganese, iron, copper, cobalt and sulfur.

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GENERAL SCIENCE

Science Talent Institute

Leading scientists addressed the 40 Science Talent Search winners who came to Washington to compete for $11,000 in Westinghouse scholarships.

See Front Cover

➤ THE YEAR's top high-school scientists made an honor-trip to Washington to attend the Science Talent Institute as the culminating event in the Science Talent Search, conducted by Science Clubs of America, administered by Science Service.

There they heard eminent scientists whose talks are reported in this issue of the SCIENCE NEWS LETTER. Coverage of the Institute will be continued in the issue of March 15, also, when the scholarship winners will be announced.

President Truman

The picture on the cover of this SCIENCE NEWS LETTER shows the winners at the White House, where they were welcomed by President Truman. He urged them to develop a common sense ability to apply their scientific knowledge to the world's problems. He told the teenagers that the next generation will depend increasingly on scientific knowledge and that we need people to put scientific ability to work for the benefit of the entire world.

In response to an invitation extended to him by one of the young scientists, President Truman paid a surprise visit to the Saturday evening hobby dinner. For about a quarter of an hour, the President, accompanied by his staff, viewed the project exhibits and then he continued into the annual dinner of the White House Correspondents Association which he came to the Hotel Statler to attend.

Heart Surgery Advancing

➤ A GROUP of nearly 300 "blue babies" who have been given a new lease on life by a surgical operation point the way to surgical rescue of other patients with heart disease.

"Surgery of heart disorders is in its infancy and many advances will be made in the future," Dr. Alfred Blalock, professor of surgery at Johns Hopkins Medical School and originator of the "blue baby" operation, declared at the Sixth Annual Science Talent Institute.

Forty high school seniors, boys and girls who are winners this year of the Science Talent Search conducted by Science Service for Westinghouse scholarships that may enable them to become famous surgeons some day, heard Dr. Blalock describe the "blue baby" operation and saw moving pictures of it.

The operation has been performed on about 330 patients at the Johns Hopkins Hospital in the past two years. Similar operations have been performed in other hospitals. The overall mortality rate is about 18%.

Most of the patients who have survived the operation are markedly improved, Dr. Blalock reported. Some of the patients who could walk only a block or two before the operation can now walk miles.

The so-called blue babies, some of whom are not infants, are blue because their blood does not contain enough oxygen, Dr. Blalock explained. In most cases this is because the blood vessel which ordinarily transports blood to the lungs where it takes up oxygen from the inspired air is constricted. The blood flow to the lungs is markedly reduced and hence an inadequate volume of blood is exposed to oxygen.

The "blueness" or cyanosis of the patient may be very marked.

Much more alarming is the incapacity of the patients. Most of them can walk only a short distance and this only with undue effort. Furthermore, many of them develop complications such as thrombosis or clots in the blood vessels of the brain resulting in paralysis.

The operation consists of the making of a shunt or by-pass between a branch of the aorta which conducts blood to the body (excluding the lungs) and the pulmonary artery (beyond the point of constriction or stenosis) which transmits blood to the lungs. Fortunately the pressure within the aorta is very much higher than that in the pulmonary artery. A large volume of blood will reach the lungs through a relatively small artificial opening and will take up oxygen, thereby reducing the cyanosis and the disability.

Stars from Atomic Action

➤ ATOMIC COMMOTION may well be behind the activity that causes a star to burst forth into a bright light, only later to fade into its former obscurity.

The theory of the cause of a "new star," known as a nova, was presented by Dr. Samuel G. Hibben, Westinghouse scientist, to 40 high school seniors from widely distributed schools throughout the country.

Explanations of novae have brought

TALKING SCIENCE—Winners heard scientists and talked with them at the Science Talent Institute. These students are questioning Dr. M. A. Tuve.

varying theories among astronomers, Dr. Hibben said, and expressed his belief that they probably are caused by a "species of molecular or atomic disintegration rather than by frictional heat dissipation. Development of the atomic bomb, which possibly is a miniature nova built on earth, will help science to better understand novae."

The mercury vapor lamp, and other modern electric light sources, were described by the Westinghouse lighting specialist as "distant cousins" of the atomic bomb. The methods of producing artificial light by other than incandescent means, he pointed out, "are remarkably similar to methods used in creating the world's most powerful explosive, although the lamps are tamed considerably by controlled operation."

The atomic bomb tests proved that the bomb was a tremendous illuminant as well as a powerful explosive, Dr. Hibben continued, thus giving the scientist "a hint of the atomic rearrangement likely to emit tremendous quantities of light. Consequently, modern lamps that operate on the general principle of atomic disturbance contain a hint as to how these new light sources can be of the highest potency."

Hopes for future progress in lamps are pinned primarily upon advances in fluorescent and other vapor discharge light sources unknown to the public a decade ago. Incandescent types will continue in wide use in spite of the fact that attainment of their peak efficiencies is not far away.

Milky Way to Be Mapped

➤ RESEARCHES of the past few years at Harvard's Oak Ridge astronomy station in Massachusetts have been merely pilot programs for the great study ahead of the Milky Way system, Dr. Bart J. Bok, associate director of Harvard College Observatory, told 'teen-age scientists attending the Science Talent Institute.

A five-year plan just inaugurated at Harvard should enable us to map accurately not only the direction, but the exact location in space of stars in our own Milky Way galaxy, Dr. Bok informed them. The survey should pry loose secrets about the heavens to a minimum distance of 117 million billion miles from the sun, and is expected to disclose information about the sky right up to the center of our Milky Way system.

The organization of the study and the methods to be employed have already been tested in small-scale programs for a few regions of the sky. Star counts and color measurements made at the Oak Ridge station near Harvard have given experience of great value in planning the equivalent southern programs.

The proposed five-year study of stellar distribution should throw light on the spiral character of our galactic system and—most important—give clues to the population characteristics of the central star clouds. It is expected to reveal whether the observed faint, red stars in the central clouds are highly-reddened luminous giants, seen through a thick cosmic mist, or truly red stars seen through a relatively thin haze. Astronomers should discover at what distance from our sun the increase in star numbers indicates that we are coming into the central star clouds.

Western Culture Minority

➤ WESTERN CIVILIZATION, already outnumbered two to one in the population of the world, is becoming an even smaller minority, Dr. Frederick Osborn, director-at-large of the Social Science Research Council, warned the group of young scientists.

Only about 600,000,000 people of the world's population of 2,000,000,000 have the Western European tradition of Christianity, self-government and freedom, Dr. Osborn said.

In the next 25 years, western civilization will barely hold its own in population, he predicted, while Asia will increase by 350,000,000 unless war or famine wipe out large numbers. Russia will gain 50,000,000 in the next quarter-century, and Africa 60,000,000 people.

"If we are going to spread the American way of life, which we so much believe in," Dr. Osborn declared, "we are going to have to do some pretty fancy missionary work, or we will be swamped by quite alien cultures in which life is held very cheap and in which the individual and his right to the pursuit of happiness are negligible."

Science, by increasing our knowledge of man and his behavior, can help spread our ideals to the rest of the world, the social scientist told the teen-age scientists.

"For the first time we have a little real knowledge about individual differences," he said, explaining that personnel work by industry and the Army, studies of consumer interest, public opinion polls and new sampling methods and techniques are all beginnings toward an understanding of the effect of different surroundings on human attitudes and motivations.

Tools provided by science offer a hope for the future of introducing a more rational way of thinking to the world, Dr. Osborn concluded.

Earth Magnetism Changed

➤ THE EARTH'S magnetic field as it existed 20,000 to 30,000 years ago is being studied by modern scientists, Dr. M. A. Tuve, director of the Department of Terrestrial Magnetism, Carnegie Institution of Washington, told the Science Talent Institute.

Dr. Tuve, who directed part of the work on the World War II proximity fuze, explained that very slight permanent magnetism still remains in annual glacial clay-deposits, called varves.

A compass of several thousand years ago would have slowly varied in direction over a period of years. Systematic studies have shown this change during the past three centuries, Dr. Tuve said.

Future research in physics, the scientist told the teen-age group, will cover a much wider field than atomic energy and artificial radioactivity.

He showed motion pictures revealing the recent discovery of rapid variations in the ionized part of the upper atmosphere. Discovery of these changes, due to inrushing clouds of particles from the sun, was made with a radio pulse technique.

Science Must Have Freedom

➤ INTERNATIONAL freedom in science was termed essential to the welfare of the world by two of America's leading scientists as they answered questions from teen-age winners of the Sixth Annual Science Talent Search.

Dr. Harlow Shapley, director of the Harvard College Observatory and president of Science Service, and Dr. E. U. Condon, director of the National Bureau of Standards, were guests of Watson Davis, director of Science Service, on Adventures in Science heard over the Columbia Broadcasting System. They discussed "International Cooperation in Science" with some of the 40 high school scientists.

Describing freedom to scientific research as "one of the essential elements in the civilization we have all been fighting for," Dr. Condon declared, "we must have freedom from secrecy and freedom from national boundaries."

Questioned concerning military secrecy by one of the high school scientists, Dr. Condon said secrecy "should not be applied to scientific principles and basic research data.

"As long as we have armies and navies and air forces with their military equipment, it will be desirable to keep secret specific design features. Such a policy would not react unfavorably on international cooperation in science, and it won't hamper the work and the development of our own science," the director of the Bureau of Standards explained.

Dr. Shapley, who recently returned from lectures and conferences in India, said, "Science is an integral part of the culture and civilization of America.

"But our science must not be nationalistic. In these days of a shrinking planet, and an expanding brotherhood of men of all latitudes and longitudes, we must develop planet-wide concepts of the functions of science in society," the astronomer declared.

Urging young scientists to tackle "scientific problems on an international basis," Dr. Shapley suggested nutritional studies as an example.

Students of nutrition and allied problems "should think of the nutrition problems of the Tropics and the Arctics, as well as what goes best for us in the Temperate Zone."

Dr. Shapley reported that several hundred students from India are on the waiting list for one American technological school alone and that there are other countries whose students seek to enter our colleges and universities.

Explaining that he was startled to learn of this situation, the scientist added, "And the situation disturbs me because I fear that we in the fields of education and science do not sufficiently realize our heavy responsibility in the advancement of civilization and our golden opportunity to serve the world."

Science News Letter, March 8, 1947

MEDICINE

Legs Saved From Gangrene

Vitamin-amino acid combination starts body reactions which halt gangrene. Treatment may be useful for other blood circulation-impaired diseases.

➤ FIVE VETERANS who faced amputations of feet or legs because of gangrene are on the road to recovery. Their blackened, shrivelled, mummified toes are getting soft and pink and ready for walking.

Another six are also recovering from the same excruciatingly painful blocking of blood circulation which caused gangrene in the first five.

A new treatment with a vitamin and an amino acid is responsible. It was devised by Drs. Zolton T. Wirtschafter and Rudolph Widmann at Wadsworth General Hospital, Veterans Administration Center, Los Angeles, as reported to the *Journal of the American Medical Association* (March 1).

Patients with disease of the heart's artery, with angina pectoris, high blood pressure, kidney disease, paralytic strokes and a half dozen serious ailments may be helped by this same new treatment.

The treatment itself consists of injections of synthetic vitamin C, or ascorbic acid, and of another chemical, histidine, which is one of the amino acids that are building blocks of protein.

Vitamin C converts histidine into another chemical, histamine. This was a test-tube discovery made 10 years ago by a German chemist, P. Holtz. The VA doctors are apparently putting the same chemical reaction to work in the bodies of the patients.

Histamine has a powerful dilating effect on small blood vessels. Contraction of small blood vessels by inflammation of the lining of the vessels or the presence of clots in the vessels can dangerously slow blood circulation. Gangrene is one result. Tissues deprived of blood die and decay. The affected part must be cut off to stop the spread of the gangrene, if possible. Before the gangrene, patients suffer horrible pain which frequently cannot be relieved by any drug.

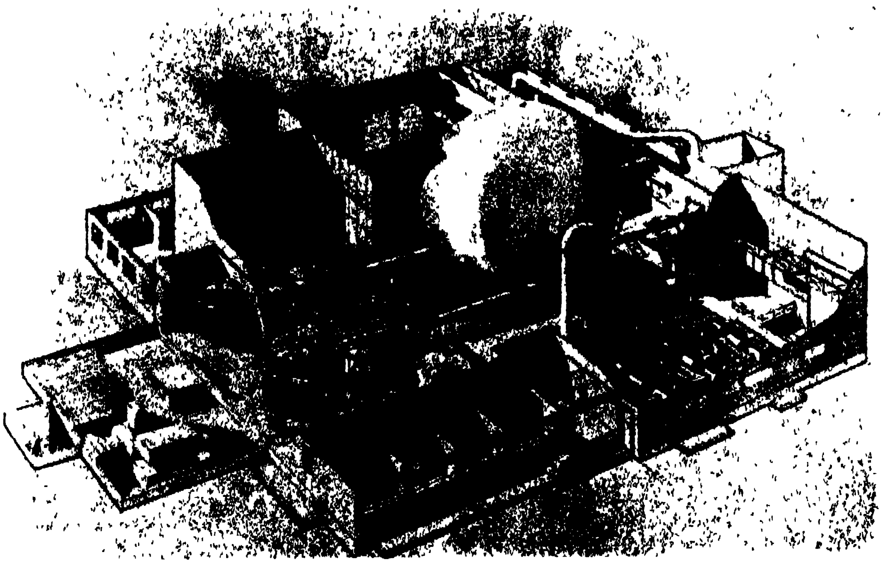
Getting the blood circulating again is the object of doctors treating the condition. In New Orleans Dr. R. A. Katz, after heroic experiments on himself, tried injecting ether into the patient's veins to increase circulation of the blood.

Drs. Wirtschafter and Widmann tried this ether treatment. They found it helped some patients but not all, and caused complications which made it necessary to discontinue the ether injections. Studies they made of the patients getting the ether treatment, however, suggested that it increased circulation by causing a release of histamine in the body.

This gave them the idea of trying the vitamin C-histidine reaction to produce histamine.

The results, with patients relieved of pain in a few hours and gangrene beginning to clear up in a day or two, make the method worthy of further investigation, they believe. They are going to try it for a number of serious diseases in which blood circulation is impaired.

Science News Letter, March 8, 1947



WIND TUNNELS—Original supersonic wind tunnels captured at Kochel, Germany, will be reinstalled in this special building of the new Naval Ordnance Laboratory, now under construction at White Oak, Md.

PUBLIC HEALTH

Well-Grandparent Clinics Are Predicted for Future

➤ WELL-GRANDPA and grandma clinics may be on their way. They would be the equivalent for the old folks of the well-baby clinics to which for many years mothers have been taking their babies at regular intervals. At the well-baby clinics the young ones are weighed and measured and examined. Mother tells doctor whether she has been having any trouble getting the baby to eat or to behave properly. Doctor gives advice on diet, habit training, how to keep baby well. If any physical defects or ailments are found, proper methods of correction are suggested.

At the well-grandpa and grandma clinics the procedure would be somewhat similar. The weekly or monthly measurement of height would not be necessary, nor would the old folks be likely to get "shots" to prevent them from "catching" diseases. But they would be weighed and examined carefully by the doctor. Suggestions on diet, or remedying of defects and ailments from poor eyesight to cancer, and on living habits would be made.

Signs that such clinics may be coming are seen in the increased interest in problems of aging now being taken by health and medical authorities. Another sign is the establishment within the Indiana State Board of Health of a division of adult hygiene and geriatrics. This is like the divisions of child hygiene and pediatrics which many state health departments have now.

People who are growing old do not have to be senile, that is, feeble in mind and body, any more than children have to have rickets, Dr. William F. King, director of the new division, points out. Helping men and women who are living longer to live better is, he says, the objective of his division.

Science News Letter, March 8, 1947

PHYSICAL CHEMISTRY

Magnet Measures Amount Of Oxygen in Gas Mixture

➤ PROF. LINUS PAULING, one of the best known of American chemists, has taken out patent 2,416,344 on a device that measures the relative amounts of oxygen in mixtures of gases. It depends on the known fact that oxygen is slightly attracted to a magnet, while most other common gases are repelled.

The device consists of a pair of spheres connected by a slender rod, suspended between the poles of a strong magnet by a filament attached to the middle of the rod. Response of the spheres to the magnetic pull is conditioned by the oxygen concentration; the amount and rate of their swing is registered by means of a light beam reflected from a small mirror attached to the filament.

Dr. Pauling has assigned rights in his patent to the California Institute Research Foundation.

Science News Letter, March 8, 1947

MEDICINE

Emotional Tension Starts Trouble Like Sinusitis

➤ ABOUT THIS TIME of year a good many persons suffer attacks of sinus trouble. Some of these cases are probably the aftermath of a cold or other infection of the nose and throat. Some of the cases, however, and probably particularly those in which the trouble hangs on for months and keeps coming back, may be due to emotional tension.

True sinusitis is an inflammation of the sinuses, which are the air-containing cavities in and around the nose. Pus is formed and retained in the sinuses and must be drained out. Sometimes this can be done by shrinking the tissues with medicines, letting the pus flow out. Sometimes the doctor must insert a large needle into the sinus and wash the pus out.

How emotional tension can bring on sinus symptoms, such as a stuffy nose, mucous discharge and headache, is explained in a recent report from the National Hospital for Speech Disorders somewhat as follows:

Tension results in disturbed activity of the autonomic nervous system. This system is the body's chief integrating mechanism. Tension working through it may affect the body generally, making you feel irritable and nervous, or it may affect just one part of the body. An example of the local effect is excessive sweating of the palms of the hands when a person is tense and anxious.

Instead of getting clammy hands when tense and anxious, some people may get what amounts to clammy noses. The membranes inside the nose may swell, causing congestion and stuffiness, or they may secrete an overabundance of mucus, or both. The person with this state of nose thinks he has sinus trouble.

Science News Letter, March 8, 1947

IN SCIEN

OPTICS

Removing Reflections Gives Better Television Pictures

➤ THE PROCESS that produced glareless glass for military field glasses during the war is now used to give clearer, sharper television pictures, the American Optical Company revealed.

The method removes light-consuming reflections from the glass face of the cathode-ray tube which serves as a screen of a direct-viewing home television receiver. It also produces images of greater clarity when used with the projection type receiver.

The reflections are removed by directly coating the face of the television tube with a chemical substance based on a silicon composition on which patent applications have been filed. It is not necessary to disassemble the tube for the coating process, or to apply the coating in the vacuum chambers used in earlier glare-removing methods.

By reducing the reflections in the glass face of the tube caused by light in the room in which the television receiver is located, false images caused by reflections are eliminated, and more light is transmitted.

Science News Letter, March 8, 1947

CHEMISTRY

Use of Fluorine in Rubber Synthesis Improves Product

➤ AN IMPROVED TYPE of synthetic rubber, especially well adapted for use in electric insulation, is the subject of U. S. patent 2,416,456. The inventor, Dr. L. Frank Salisbury of Wilmington, Del., has assigned rights to E. I. du Pont de Nemours and Company.

Hitherto, a special rubber for this purpose has been produced as a copolymer of chlorinated butadiene (chloroprene) with styrene. Dr. Salisbury substitutes chlorine's once-wild chemical cousin, fluorine, using essentially the same formulae and methods of preparation. The new compound has high resistance to the aging effects of sunlight and ozone and to the action of oil and other rubber solvents, remains highly elastic at low temperatures, and shows surprisingly high tensile strength.

Science News Letter, March 8, 1947

E FIELDS

RADIO

Visual System Monitors Many Radio Channels

➤ A VISUAL SYSTEM for simultaneous monitoring of many radio channels is covered by patent 2,416,346, granted to Ralph K. Potter of Madison, N. J., a Bell Telephone Laboratories engineer. An oscilloscope, with the sensitive surface in a band around the equator of its spherical head, is kept constantly rotating, while the beam that registers incoming radio waves is deflected onto the luminescent area.

Science News Letter, March 8, 1947

GENERAL SCIENCE

Successful Scientific Research Needs Freedom

➤ HUGE-SCALE scientific operations, such as those that produced the atom bomb, are no guarantee of success in fundamental research, Prof. Henry W. Smyth, Princeton University physicist who wrote the first comprehensive account of the production of atomic energy for military purposes, usually known as the Smyth Report, declared in an address before the Sigma Xi chapter of the University of Washington at Seattle.

The titantic effort symbolized by the name, Manhattan Project, he pointed out, "was principally applied physics and therefore its successes in terms of organization and direction have little bearing on the future of fundamental scientific research."

The first actual production of energy through nuclear chain reaction, he said, was achieved in an experiment on a laboratory scale in Chicago in 1942. In reality, it was done in much the same manner as it would have been done in a peacetime laboratory.

Without underestimating science's need for powerful research machines, Prof. Smyth continued, "it should be emphasized that freedom from too much direction or supervision appears to be a necessary condition for productive scientific research.

"This freedom is meaningless without freedom of publication and of international exchange of information. It may be that the requirements of international politics will interfere with these conditions, but let us not have any illusions.

"No amount of government financing or of organization and official correlation will automatically keep free imaginative research going. Men of first-class research ability will be stultified or more probably will be diverted to fields of research where there are no restrictions.

"The war period was a period of cessation of scientific research and a continuation of a war atmosphere will prevent the healthy rebirth of scientific research."

Science News Letter, March 8, 1947

PLANT PATHOLOGY

Late Tomato Blight Makes Early Appearance

➤ LATE BLIGHT is making an early appearance in Florida tomato fields, according to reports reaching the U. S. Department of Agriculture. This fungus disease, which devastated the commercial tomato crop in the East last summer, started in the same state and marched up the map as the season advanced. Some Florida growers have already stated that their efforts to combat the new outbreak with highly-touted new organic fungicides have not been too successful so far.

Tomato growers were caught off guard last year, because it had been a long time since weather conditions favored an outbreak. This time they do not mean to repeat that costly experience. They have been making heavy purchases of spraying apparatus and laying in supplies of chemicals.

Scientists at the state agricultural experiment stations have set up an intelligence service. They will gather information from the field and forward it to a clearing-house at the Department of Agriculture in Washington, where it will be digested and put into bulletin form for prompt distribution.

Forces of defense are thus better armed and better organized than they were in last year's disaster.

It may turn out that these precautions are unnecessary. The blight fungus thrives best in damp, cool weather, and in warm, dry years does not amount to a real menace. A study of its recent history shows that its two severe outbreaks in the past seventeen years have come when prevailing temperatures during May and June have been below 75 degrees Fahrenheit, with rainfall above normal.

Science News Letter, March 8, 1947

MEDICINE

Amino Acid Enters Black Cancer Mystery Solution

➤ SOME of the mysteries of black cancers, called melanomas, may be solved through a new tool built in the Radiation Laboratory of the University of California.

The new tool is a fundamental body chemical which has been synthesized with radioactive carbon. The chemical is tyrosine, one of the amino acids which are building stones of proteins. Its synthesis with radiocarbon was accomplished by Dr. J. C. Reid working under Dr. Melvin Calvin, according to a report to *Science* (Feb. 21).

Tyrosine may be involved in the black cancers, or melanomas. The cancers are black because they contain a substance called melanin. Melanin gives the dark color to dark hair, skin and eyes. Tyrosine may be the material from which certain cells of the body make melanin.

The exact relation between tyrosine and melanin and melanomas and the reason why some melanomas lose their power to produce blackness may be learned with the tyrosine that can be traced through the body by its radiocarbon.

Even more immediate practical use of tyrosine with radiocarbon may be made in the study of plants. Tyrosine or a close chemical relative plays a part in the blackening of potatoes and apples. More knowledge of this reaction and how to combat it may come from the new radiocarbon-tyrosine.

Science News Letter, March 8, 1947

ENGINEERING

Low-Melting, Fusible Vents Localize Fires in Buildings

➤ A NOVEL IDEA for localizing fires in large factory or warehouse spaces is embodied in patent 2,416,284, granted to Arthur L. Brown of Boston, assignor to the Factory Mutual Research Corporation. His design calls for the incorporation of panels of low-melting-point materials, such as fusible alloys, rubber compounds or plastics, into the roof structure. The idea is that if a fire can quickly make a hole in the roof it will not spread laterally, nor will smoke fill the building, preventing effective approach of firemen.

Science News Letter, March 8, 1947

MATHEMATICS

Your Chances at Betting

Gambling can be discussed as a matter of mathematics, but professional gambling does not offer as good odds as mathematical chances.

By HOWARD D. GROSSMAN

➤ LIFE is a gamble. Every time we make a choice or a decision, we gamble. Even marriage is a lottery.

Betting is just one phase of gambling. In the matter of morality, mathematics is perfectly neutral. Gambling can be discussed purely as a matter of numbers.

Some of the greatest mathematicians, like the Frenchmen, Pascal and Fermat, calculated the chances of the gaming-table. Out of their discussions were born the great branches of mathematics: probability, statistics, theory of combinations and actuarial science.

Probability is vital to life insurance, the study of heredity, prediction of the weather and a thousand other activities.

When the odds in gambling are mathematically correct, the favorable and unfavorable chances are perfectly equal. In professional gambling, however, the market odds fall short of the correct odds, and your chances of winning are not so good.

Some Money Lost

From an alleged perpetual-motion machine we get less energy than we put in because some of it is dissipated in friction and heat. So from professional gambling we receive less money on the average than we bet because some of it is dissipated in the maintenance of gambling quarters, material and personnel.

The thrill of gambling is a commodity that must be paid for. The difference between the market odds and the correct mathematical odds determines its average cost.

In professional gambling the house usually withdraws the following percentages of the total money bet, redistributing the rest among the gamblers:

Roulette (French type, single zero)	3%
Roulette (American type, double zero)	5%
Chuck-a-luck	8%
Sporting events with odds of 5 to 6 on either side	8%
Horse races	15%
Slot machines	at least 25%
Numbers racket—a gross swindle	50%

The house takes its percentage of the money you bet as well as the money you win. This is more than the house percentage of your winnings alone and has the effect of shortening the correct odds by more than the house percentage. The smaller the correct odds, the sharper the cut. Thus if the house percentage is 10 per cent and the correct odds are 1 to 1, the odds become only 4 to 5, a drop of 20 per cent.

An illusion prevails that a betting system increases one's chances in gambling. In the popular system of doubling up, where you risk a dollar on an even bet like the toss of a coin and double the bet after each loss until you win—if ever there always remains a small chance of losing a large sum. As the chance becomes smaller, the possible loss increases. This risk always exactly compensates for your near-certainty of winning $1.

The superstitious faith in the magic of a betting system is founded on a misconception of the basic law of chance. If the number of heads in a series of throws really tended to equal the number of tails, then each past tail thrown would have to increase the chance of a future head. But it is not the total number of heads tossed that tends to equal that of tails, but the percentage of tosses that tends to be equal.

Consider the case of a man who, in tossing a coin, gets heads the first 20 throws, then heads and tails alternately thereafter. If he tosses the coin only 20 times, only heads turn up. If he tosses 40 times, his score is 75 per cent heads and 25 per cent tails. But when he tosses the coin 1,000 times, only 51 per cent of his throws show heads and 49 per cent tails, or a fairly equal number of each.

Long Series Improbable

A series of 20 heads would be very rare. Yet when it comes both in theory and in practice, it will be followed as often as not by another head. A coin has no memory of how it fell on previous throws.

An exceedingly long series of heads would be so improbable as to establish an imperfection in the coin. This would persuade an observant person to bet not on tails but on another head. Similarly a number that has turned up often at Monte Carlo is perhaps a better bet than one that has not. There is no future compensation for the latter, while repetition

TAKING CHANCES—Large amounts are lost and won in gambling houses such as the one shown in the motion picture, "Lady Luck."

of a number suggests a possible bias in the wheel.

Other, more complicated betting systems than doubling up are based on the principle of increasing one's bet less than 100 per cent after a loss and diminishing it after a win. In this way more money is usually staked on winning bets. There is even a curious system in which two partners make opposite bets in roulette, the net effect being the difference of their bets on each play.

Systems Do Not Work

But none of these systems works. Every system carries a small chance of a great loss, and the smaller the chance, the greater loss. It will fail just often enough and cost just enough to cancel all its gains.

No mere combination or arrangement of bets can disturb the balance of favorable and unfavorable chances for each bet. No mathematical jugglery can cancel one iota of the total risk. You can only rearrange the hazards, concentrate or distribute them, but not change their sum.

Some gamblers feel it should be mathematically possible to distribute bets in a horse race so as to win, or at least break even, no matter which horse wins. Market odds make this impossible.

Consider a race between two horses, All Ahead and Blue Bell, the first of which would win twice as often as the second. Knowledge of their relative performances would result in twice as much money being bet on the first as on the second.

Correct Odds

The correct odds would be 2 to 1 on Blue Bell and .50 to 1.00 on All Ahead. If the track percentage were 15 per cent, the odds would become 1.55 to 1.00 on Blue Bell and only .55 to 2.00 on All Ahead.

When the odds are correct, you would break even if you bet $2 on All Ahead all of the time, winning two-thirds of the time, or if you bet $1 on Blue Bell, winning one-third of the time. But by such betting at the above track odds, you would lose 15 per cent of the total amount bet.

If you have $3 to bet on a race, you will break even regardless of the result if, when the odds are correct, you bet $2 on All Ahead and $1 on Blue Bell. But at the above track odds, this system, which represents the best possible hedging, will always result in the loss of 15 per cent of the total amount you bet.

TURF BETTING—Odds 20% lower than correct mathematical odds are usually offered by the race track.

Every gambler feels that though his system may fail for any given number of bets, it is bound to succeed eventually if he only plays it long enough. But to survive a long chain of possible losses requires an almost inexhaustible fortune.

A person with $99 gambling fairly against with $1 will win the $1 a total of 99 times out of 100, but the hundredth time he will lose his whole $99. The small chance of a great loss inevitably recurs and restores the perfect symmetry between favorable and unfavorable chances.

In professional gambling, the greater fortune generally belongs to the bank. The inveterate gambler who is never content with moderate gains or losses is in effect pitting his limited wealth against the relatively limitless resources of the gambling bank, or even of society at large. Here his near-certainty of losing is counterbalanced by the fabulous fortune which he has one chance in millions of winning.

On rare exceptions the odds might even favor the bettor. The odds on a fight, for instance, might be 6 to 5 at one place and 5 to 6 at another because of the way the fans of the two fighters are placing their bets. Then by betting $5 against $6 at each place, you are bound to win $1.

Bettors who maintain such inconsistent odds are putting you in the position of the gambling bank. Collectively they are giving money away, and there is no mathematical argument against taking such money if you are ever lucky enough to find it. But these odds could not be maintained long in an open market without bankruptcy. In general, market odds fall substantially short of the correct odds.

Similarly, if the odds on the same event are first 6 to 5, and then 5 to 6, by betting $5 against $6 at each time, you are bound to win $1. But you are still flirting with chance. In making the first bet, you were making in addition a concealed bet that the odds would change in your favor, a bet which you might have lost.

In any gambling, the odds are slightly against the bettor because the money he may gain by an even bet has a slightly smaller value to him than that which he may lose. This difference in value is negligible for small variations in his fortune, but may become ruinous for large sums.

Science News Letter, March 8, 1947

Hybrid varieties of *popcorn* are popular because they expand about one-fourth more than ordinary popcorn in popping.

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Do You Know?

In cold countries such as Alaska, crop *plants* seldom put their roots down into the soil more than eight inches, although plants of the same kinds penetrate far deeper in warmer climates.

Pocket mice, kangaroo mice, kangaroo rats and dipodomys are among small animals found in the sand dunes of *Nevada;* they live principally on the seeds of desert grasses and other vegetation.

Malta island, in the Mediterranean, has mysterious monuments and ruins of stone-age temples that show it was inhabited many hundreds of years before Christ; it has also fossil remains of now extinct animals.

England is producing a phenol-formaldehyde *coating* for wood and metal products that is claimed to be resistant to heat, moisture and chemical action, and offers protection against termites and marine borers.

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BACTERIOLOGY

Nazi Try at Germ Warfare

Underground movements to make biological warfare weapons could do considerable damage. Attempts would have been unsuccessful because of U. S. vaccines.

➤ DEVELOPMENT of germ warfare weapons by an underground movement in former enemy territory, such as is reported claimed by Nazi diehards just rounded up by American and British occupation forces, is perfectly possible.

A few fanatic scientists, working secretly in an attic or cellar laboratory, could produce enough deadly germs to do considerable damage, if they could find ways of dispersing them on unprotected populations. Producing weapons of germ warfare does not require the amount of space, money, manpower and materials needed to produce atom bombs.

Nazis at Work

Nazi scientists were working on biological warfare during the war. This was disclosed at the Nuremberg trials of Nazi physicians as war criminals.

The Nazi bacteriologists believed that the only way the Nazis could conquer the United States would have been by a three-pronged germ attack against man, domestic animals and food plants. They realized that they were considerably behind the Americans in development of germ warfare, and wanted to speak to Hitler and get his support for further work on this line.

The underground attempt to develop germ warfare weapons probably was an effort to continue the work begun during the war. Unless a great deal of progress had been made since the war, it probably would not have succeeded. Documents at the Nuremberg trials showed that the Nazi bacteriologists had only one experiment which they considered so successful they need not repeat it. In other words, they apparently thought they had one weapon ready for use if Hitler had been willing to use it.

This weapon may have been rinderpest. In that case, it was doomed to fail because American and Canadian scientists had developed a successful vaccine for protection against this devastating cattle plague.

Plague and anthrax are two diseases mentioned in reports of the underground movement just discovered. There is reason to believe we had defenses against these germ weapons also.

Underground attempts to develop germ warfare weapons might well prove suicidal to the underground workers themselves. Elaborate precautions to protect workers from the deadly germs they worked with were taken in our own biological warfare station at Camp Detrick, Md. In spite of this, some cases of disease developed. It would be even harder to take adequate protective measures in an underground, perhaps poverty-stricken laboratory.

The suicidal results might have extended to the German civilian population if a weapon such as plague had been loosed against the occupation forces. While rats and lice for spreading bubonic plague may be controlled in occupied Germany, pneumonic plague spreads directly from man to man and is highly contagious as well as highly fatal. Underfed German civilians would be as ready prey to its onslaught as the occupation troops.

BW Failure

Successful attack on growing crops could probably not be made by underground BW plotters. Growth-promoting hormones, which are the munitions of this kind of warfare, require rather elaborate chemical setup to produce. Once produced, they have to be sprayed over wide areas to have material effect. The only practicable means for this is aircraft, and in considerable numbers at that.

Even during the war, though the Nazis had excellent chemical manufacturing plants and could have produced the hormones in any necessary quantity, they could not have attacked American crops because they lacked far-ranging aircraft to distribute the sprays. We had the chemicals, we had the planes, and if the war had continued into 1946 we could and would have attacked both German and Japanese crops with this new weapon.

Science News Letter, March 8, 1947

It is estimated that about one person in every 10,000 is an *albino.*

ZOOLOGY

NATURE RAMBLINGS

by Frank Thone

Usefulness of Bats

➤ IF BATS FLEW in the daytime instead of at night, if they sang sweetly instead of merely squeaking, if they looked less like winged mice—in short, if bats were birds, doubtless people would like them better. Yet even in their unloved, hobgoblin form, bats are highly useful animals, rivalling, or rather supplementing, birds in their role as insect-catchers.

At a recent meeting of the National Speleological Society, Charles E. Mohr of the Academy of Natural Sciences of Philadelphia called attention to the economic importance of bats. Many people already know that bats destroy enormous quantities of insects, especially moths, insects and beetles. However, one important angle may have been overlooked: since bats fly at night, when most insect-eating birds are asleep, they take toll of nocturnal insects that would otherwise escape.

All species of bats in this country are insectivorous, and may therefore be rated as "good" animals from the human point of view. We do not have the shudder-causing vampire bats or the orchard-raiding fruit bats of the tropics in our cooler regions, so the aura of wickedness that has somehow attached itself to bats really doesn't fit, so far as the United States is concerned.

Bats' insect-destroying activities, like birds', have sometimes been overrated. It is unlikely that any insect species has been destroyed, or is even kept down to minimal numbers, by either bats or birds. Our living insect-traps, whether their wings be leathern or feathered, are useful but are not the final answers to insect pest problems. For this reason, the much-publicized bat roosts that were erected a couple of decades ago, were foredoomed to failure in their mission as mosquito-control devices.

Bats have a positive economic importance as well as the negative one of insect destruction. As fish-eating birds leave heavy deposits of guano, valuable as fertilizer, on their island rookeries, so bats build up accumulations of guano on the floors of their cavern roosting-places. Mr. Mohr stated that something like $500,000 worth of guano has been taken out of Carlsbad Caverns alone. And during the War of 1812 and the Civil War, bat-guano deposits in Southern caves were important sources of saltpeter, necessary ingredient of black powder.

Science News Letter, March 8, 1947

GENERAL SCIENCE

Scientific Talent Doesn't Follow Parents' Occupation

➤ SCIENTIFIC promise in young people has no discernible relation to what their parents do, it is disclosed by a study of the parentage of the 40 winners in the Sixth Annual Science Talent Search who gathered in Washington for the five-day Science Talent Institute.

Businessmen and lawyers are among the fathers of the young men and women who represent the cream of this year's scientific crop among high school graduates, but others list paternal occupations as laborer, electrician, carpenter, tailor. Numerically the occupations are listed as: eight businessmen, six teachers, three engineers, three lawyers, two investment brokers. The following occupations are represented by one father each: clergyman, publisher, compositor, tailor, carpenter, biologist, laborer, electrician, plant quarantine inspector, well driller, motion picture writer.

All mothers listed are homemakers, but some are able to carry on full-time jobs as well. Four of the mothers are teachers, and one each is occupied as dietitian, advertising director, editor, bookkeeper, factory worker.

Six of the winners have only one parent living. Ten of the 40 are only children; 20 have at least one brother or sister. Only one comes from a family with as many as four children. About 17% have parents who attended college.

Science News Letter, March 8, 1947

Nose-prints of dogs correspond to finger-prints of men; veterinarians say that every dog's nose is different, and that their nose-prints are reliable for identifying valuable animals.

OPTICS

Infra-Red Rays Used To Examine Eyes

➤ EXAMINING HUMAN eyes with invisible infra-red rays appears to be a new use for this type of radiation.

The instrument and method used was described to the American Optical Society meeting in New York by Dr. M. J. Koomen and Dr. R. Tousey, with the U. S. Naval Research Laboratory, and Dr. H. A. Knoll, now at the Ohio State University but formerly with the Naval Laboratory.

The advantage of using this invisible infra-red "light" is that it does not disturb the eye under observation as do rays from ordinary light. The reflected rays form an image which is made visible to the observer by use of a telescope similar to those used on Army sniperscopes.

The sniperscope, attached to a rifle, shot out infra-red beams which were reflected back by an enemy prowling in the dark, clearly outlining him in the receiving telescope. In examining the eye, the ray is used to measure the pupil, and the instrument is called an infra-red pupillometer.

With this device, the eye pupil appears dark and the iris bright. A lighted scale within it becomes superimposed upon both pupil and iris in such a way that it is possible to measure the pupil with considerable accuracy. The accuracy is limited largely to involuntary fluctuations and movements of the eye.

Science News Letter, March 8, 1947

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ANTHROPOLOGY

Earliest American Found

Near Mexico City the remains of an unfortunate hunter were found by a geophysical prospecting method. Skull is estimated at 10,000 to 15,000 years old.

➤ REMAINS of America's earliest known human being, with age estimated at ten to fifteen thousand years, have been discovered near Mexico City through the use of a geophysical prospecting method borrowed from seekers after oil and ores. This triumph of the very new to find the very old was achieved by a tri-national scientific team consisting of Dr. Hans Lundberg, Canadian geophysicist, Dr. Helmut de Terra, American geologist, and several Mexican scientists, operating under the auspices of the American Viking Fund, of New York.

Dr. de Terra describes the skull as very primitive, with long, narrow shape as seen from the top, a low-vaulted cranium, and pronounced eyebrow ridges. Although he does not undertake to classify it on such short notice, these features do suggest such Old World primitives as Neandertal and Peking men. Its estimated age in years, however, is considerably less than theirs. With the complete skull were some of the other skeletal bones.

This earliest American apparently came to his end in the rush and excitement of an elephant hunt. His skull and bones were found buried under about three and one-half feet of soil along with a great quantity of mammoth bones, tusks and teeth. The locality, near the town of Texpexpan, was obviously the marshy shore of a shallow lake in early post-glacial time. Apparently this luckless hunter's more fortunate mates drove the elephant herd into the marsh, where the great beasts bogged down and perished.

Earlier digs in the same vicinity had turned up numbers of stone weaponheads of a primitive pattern, and similar artifacts have been found with bones of elephants and other extinct animals in the southwestern United States; but this is the first time that any part of a human being has ever been dug up at such an ancient site. It is the find that archaeologists have been awaiting for decades.

The method used in locating the present sensational find is what prospectors call earth conductivity. It consists in sending an electric current into the ground, measuring the potential of the soil at many surrounding points, and plotting lines of equal potential. At the spot where the measurements showed the highest resistance, the scientists made their first trial dig.

They struck a bonanza.

Science News Letter, March 8, 1947

ORDNANCE

V-2 Rockets Deteriorate

➤ U. S. ARMY ORDNANCE is not having as much success firing German V-2 rockets as the Nazis who developed the weapon.

The Army at the White Sands, N. Mex., Proving Ground has fired 19 of the missiles, armed with scientists' instruments to gather data in the upper atmosphere. Of the 19 launched, five have failed to climb high over the desert in useful flights.

This gives the Army rocket-firing unit a "batting average" of slightly less than 75% for its V-2 shoots, compared with a better than 80% success claimed by German experimenters at the Peenemunde Experiment Station on the Baltic, where the weapon was tested before its use against England in World War II.

When the rockets were fired at England, an estimated 30% of them failed, but the Army program, which fires one rocket about every two weeks, is more comparable to the test flights at the Baltic station.

Army Ordnance officials believe the bad shoots are caused by deterioration. The rockets used in the New Mexico experiments were taken in May, 1945, and virtually all of the intricate mechanisms are retained intact for the peacetime scientific firing.

German scientists, who fired new rockets, believed the weapons would deteriorate quickly if not used.

Although credited by some Army sources with being the twentieth rocket fired, the one shot over the desert recently, from which scientific instruments were successfully parachuted to the earth from a high altitude, was actually number 19. First rocket of the series was given a static test on the ground without actually being launched.

In addition to the standard scientific instruments brought down by the parachute from a record altitude, fruit flies, a package of seeds and cameras loaded with color film were carried by the 'chute.

Scientists hope to learn more about the effects of cosmic rays at high altitudes from the fruit flies and seeds, while unique pictures and possible new knowledge of the upper atmosphere are expected from the camera record of the descent.

Science News Letter, March 8, 1947

MIGRATION

Mexican Border Fence To Improve Patrolling

➤ THE 2,000-MILE line fence proposed for the Mexican boundary, as an aid in keeping foot-and-mouth disease out of the United States, is not expected to function all by itself. Its advocates expect the fence, if built, to make the job of the border patrol easier and more effective—but it will still have to be backed by vigilant human eyes and ears.

The proposed fence (of which short sections have already been built) is to be of the interwoven, heavy spring-wire type often seen around factories. Its ten-foot height is necessary in order to keep deer and antelope, which are potential carriers of foot-and mouth disease, from jumping over the top. It will also have to be securely anchored in the ground, to prevent peccaries, or wild pigs, from rooting their way under.

The proposed fence is not to be thought of as a barrier against foot-and-mouth disease alone. If properly patrolled, it should do much to control smuggling, and particularly the entry of unauthorized immigrants, or "wetbacks", who at present slip across the border in large numbers during the truck-growing and fruit-picking seasons. This illicit migration is as little liked by the Mexican government as by our own, and anything that can be done to check it will be welcomed by the Mexican authorities.

Science News Letter, March 8, 1947

Soil rich in *nitrogen* is not suitable for newly rooted plant cuttings.

• Books of the Week •

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ADVANCES IN CARBOHYDRATE CHEMISTRY, Vol. 2—W. W. Pigman and M. L. Wolfrom, eds.—*Academic Press,* 320 p., illus., $6.60. An annual volume containing critical reviews of special topics in the field of carbohydrates, including sugars, polysaccharides, and glycosides, prepared by recognized authorities.

AROUND THE GARDEN—Dorothy H. Jenkins—*Barrows,* 206 p., illus., $2.50. A discussion for month-by-month use of what to do in the garden for eye-catching results

DOMESTIC HEATING IN AMERICA—Report of a Joint Party from the Ministry of Fuel and Power and the Dept of Scientific and Industrial Research—*British Information Service,* 152 p., paper, $1 A study of heating, cooking, and hot water supply in small houses in the U S.A. and Canada.

ESCUELA AGRICOLA PANAMERICANA YEARBOOK—*Middle America Information Bureau,* 38 p., illus., paper, free. Dedicated to the first graduating class from this school which is spreading improved agricultural methods in the American tropics.

GUIDE BOOK TO THE RUINS OF COPAN—Gustav Stromsvik—*Carnegie Inst. of Wash.,* 76 p., illus., paper, $1. A convenient complete list of Mayan buildings, statuary and stele at this site.

INDIANS BEFORE COLUMBUS—Paul S. Martin, George I. Quimby, and Donald Collier—*Univ. of Chicago Press,* 582 p., illus., $6. A history of the development of basic cultural trends among the pre-Columbian Indians of North America is traced through 20,000 years.

PHYSICAL CHEMISTRY — Herschel Hunt — *Crowell,* 610 p, illus., $4 75. A college text on the fundamentals of physical chemistry emphasizing the mathematical formulation of ideas with selected and graded problems covering each topic.

THE PLASTICS INDUSTRY—Josephine Perry —*Longmans,* 127 p, illus., $2. A readable account of the two branches of this industry, the material manufacturers and the producers of finished articles, in non-technical language for young people.

THE PROBLEM OF ODORS IN INSTITUTIONS —Dewey H. Palmer—*Hospital Bur. of Stds. and Supplies,* 11 p., paper, 50 cents. This tells the types and sources of odors in institutions and how to get rid of them.

PUERTO RICAN PARADOX—Vincenzo Petrullo —*Univ. of Pa. Press,* 180 p., $3. An interpretation of the relationship today between Puerto Rico and the United States with suggestions for improvement.

REPORT OF THE FAO PREPARATORY COMMISSION ON WORLD FOOD PROPOSALS, Washington, D. C., USA, 28 Oct. 1947—24 Jan. 1947—*Food and Agriculture Organization of U.N.,* 84 p., paper, free. A statement of international proposals and agreements to raise nutritional standards.

RHEUMATIC FEVER, Childhood's Greatest Enemy—Herbert Yahres— *Public Affairs Committee,* Pamphlet No. 126, 30 p, 10 cents. A comprehensive discussion of a pressing health problem.

SEMIMICRO LABORATORY EXERCISES FOR HIGH SCHOOL CHEMISTRY—Fred T. Weisbruch—*Heath,* 268 p., illus., paper, $1.48. A well planned manual resulting from practical classroom experience in adapting this cleaner and less expensive procedure for high schools.

THE SOCIAL SYSTEM OF THE MODERN FACTORY; The Strike: A Social Analysis—W. Lloyd Warner and J. O. Low—*Yale Univ. Press,* Yankee City Series, Vol. 4, 240 p., $3. The industrial history of "Yankee City" traced, showing the changed status of managers and workers, why the strike occurred, and how it progressed.

THE THEORY OF FUNCTIONS OF REAL VARIABLES—Lawrence M. Graves—*McGraw-Hill,* 298 p., $4. An exposition of the more fundamental and generally useful parts of this mathematical field, together with some theorems on implicit functions, differential equations, and Lebesgue and Stieltjes integrals.

THOMAS ALVA EDISON, Builder of Civilization—H. Gordon Garbedian — *Julian Messner,* 231 p., illus., $2.50. This absorbing story of the "man of a thousand patents" should challenge teen-agers.

UNITED STATES NATIONAL COMMISSION FOR THE UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION. Report on the First Meeting, September 1946—Dept. of State Publ. 2726, U.S.—U.N. Info. Series 14, *Govt. Printing Office,* 41 p., paper, 25 cents. The organization of America's end of UNESCO.

Science News Letter, March 8, 1947

PLANT PHYSIOLOGY

Fungus Injections Make Gum Ooze from Pines

➤ BETTER YIELDS of turpentine and rosin can be obtained by deliberately inoculating the pine trees with spores of a disease fungus at the time they are tapped, Dr. George H. Hepting, U. S Department of Agriculture plant pathologist, has discovered in experiments at the Southeastern Forest Experiment Station in Asheville, N. C., according to *Science* (Feb. 21).

He had noticed that pine branches infected with a species of Fusarium, one of the worst of plant-disease fungi, oozed quantities of resinous gum for a long time. It occurred to him to try induced infections on the slashes made on the tree trunks when the gum was wanted for production of naval stores.

He made mass cultures of the fungus and prepared a filtrate containing its spores. With the help of a colleague, E. R. Roth, he brushed this onto slashes cut through the bark of a number of trees, and into holes bored into the trunks of others. As a control, some of the same filtrate that had been boiled to kill the spores was applied to other trees.

The trees treated with the live spores yielded far larger quantities of gum, and continued the flow much longer, than did the uninfected control trees. Now Dr. Hepting is undertaking further experiments, to determine whether there are any long-time ill effects on the trees that would offset the immediate advantages of using induced infection to get more gum with less work.

Science News Letter, March 8, 1947

ZOOLOGY

Laughing Grave Robbers Come to Philadelphia Zoo

➤ THE PHILADELPHIA ZOO'S latest additions include a quartet of grave robbers, who arrived with peals of weird laughter.

Zoo officials hasten to explain that their new grave robbers, four hyenas, are actually useful scavengers who do some of nature's "dirty work" cleaning up the remains of dead and decaying animals. But the hyenas do get into graveyards once in a while.

Two of the newcomers are laughing hyenas, spotted animals from Africa with a weird, demoniacal laugh. The other two hyenas are striped animals found both in Africa and southern Asia.

Arriving with the hyenas were two antelopes, the large and beautiful greater kudu and the rare blesbok. Rounding out the strange animal party were a pair of servals, small leopard-like animals from Africa.

Science News Letter, March 8, 1947

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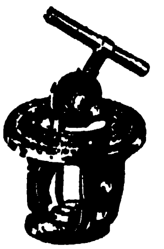

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❁ FLY WALLETS that float are for fishermen who change flies in midstream. They prevent a dropped collection of trout-bait from sinking. These English-style fly and leader wallets are made of water-resistant cork, and a transparent plastic through which the contents are visible.

Science News Letter, March 8, 1947

❁ QUARTER-ROUND trim for baseboards in homes and offices is made of steel and is designed to hold electric wiring. It is installed without the use of nails or screws by means of spaced prongs on its under rear which are pushed under the baseboard.

Science News Letter, March 8, 1947

❁ MICROPROJECTOR, an inexpensive type for school use, throws on a screen a clear picture of a specimen mounted on an ordinary microscope slide. It also can be used as a microscope by looking through the front lens. A simple attachment converts it into a film strip projector.

Science News Letter, March 8, 1947

❁ WASHBOARD, designed for women living in small apartments, is made entirely of aluminum. It is approximately 10 by 15 inches in size and weighs nine ounces. Rubber-tipped and rubber-stripped, it will neither slip nor mar porcelain washstands.

Science News Letter, March 8, 1947

❁ ELECTRIC TOOL for woodworkers and others has 36 interchangeable accessories such as abrasive wheels, drills, buffing wheels and brushes. Housed in a shockproof plastic case with an aluminum frame, the motor shaft extends to a metallic tool-gripping nose as shown in the picture.

Science News Letter, March 8, 1947

❁ NEGATIVE hanger, for photographers who do their own developing, is adjustable for the films ordinarily used. It is made of all-welded nickel-finished stainless steel, with a horizontal and a vertical movable cross-piece which are held where wanted by thumb screws.

Science News Letter, March 8, 1947

❁ FIBER-GLASS automobile tires, of high-strength glass cord fabric, have been constructed and tested but are not yet ready for the market. Lighter than other tires, their particular advantages over other cord materials are high strength and resistance to heat.

Science News Letter, March 8, 1947

❁ WATER-SHEDDER, a chemical compound which forms an invisible coating over glass, plastics, paper and textiles, prevents moisture from gathering on their surfaces. It can be used to prevent vacuum tubes from going dead under conditions of high humidity, and has many other applications.

Science News Letter, March 8, 1947

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Question Box

ANTHROPOLOGY
Where were the earliest-known American's remains found? p. 158.

ASTRONOMY
Why does a star suddenly burst forth into light? p. 149.

BACTERIOLOGY
What germ warfare weapons did the Nazi bacteriologists try to develop? p. 156.

CHEMISTRY
How is fluorine used in making synthetic rubber? p. 152.

GENERAL SCIENCE
What are the principal differences between scientists concerning a National Science Foundation? p. 147.

MATHEMATICS
How good are your chances at the race-track? p. 154.

MEDICINE
What is saving legs from gangrene? p. 151.
Why does a "blue baby's" blood not contain enough oxygen? p. 149.

ORDNANCE
Why have U. S. Army shots of the V-2 rockets not been good? p. 158.

PHOTOGRAPHY
What part of the new camera does the work of a darkroom? p. 148.

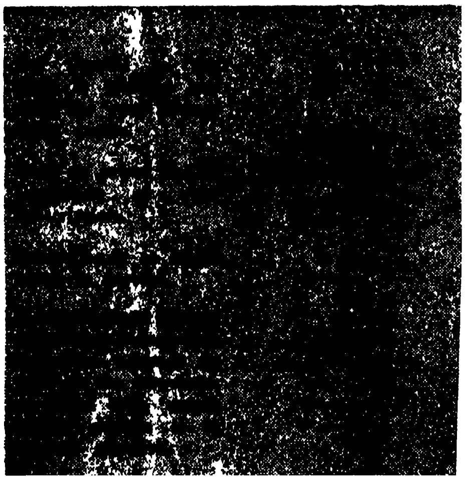
PHYSICAL CHEMISTRY
How can the relative amount of oxygen be measured in a gas mixture? p. 152.

PLANT PATHOLOGY
When does the late tomato blight thrive best? p. 1[illegible]3.

POPULATION
How does western civilization rank in number in comparison to the population of the world? p. 150.

ZOOLOGY
What good are bats? p. 157.

Where published sources are used they are cited.



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SCIENCE NEWS LETTER

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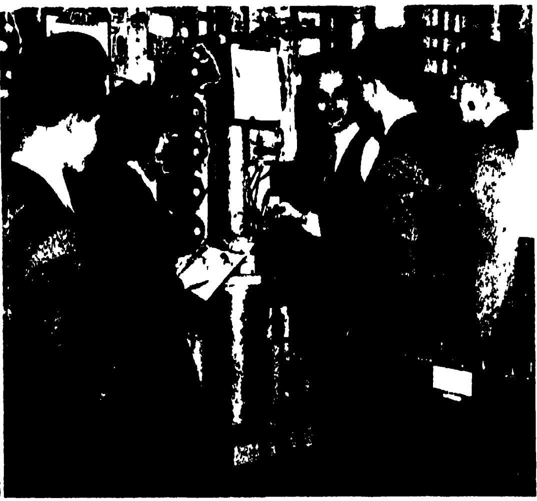

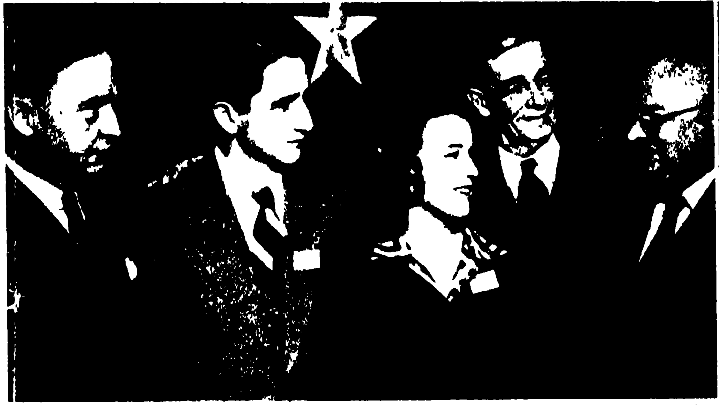

GENERAL SCIENCE

Top Science Scholarships

Products of the American "melting pot", Rada Demerec, geneticist, and Martin Karplus, ornithologist, received the Westinghouse Grand Scholarships of $2,400.

➤ THE AMERICAN "melting pot" has produced the nation's top high school scientists for 1947—the daughter of a foreign-born American scientist and a boy whose family fled to this country when the Nazis invaded their native Austria.

Vera R. Demerec, 16, Huntington High School, Huntington, N. Y., and Martin Karplus, 16, Newton High School, Newtonville, Mass., hold Westinghouse Grand Science Scholarships of $2,400. They were awarded the scholarships at the close of the five-day Science Talent Institute for the 40 winners of the Sixth Annual Science Talent Search, conducted by Science Clubs of America, administered by Science Service.

Rada

Miss Demerec, whose friends call her "Rada," studied genetics in generations of fruit flies. She plans to enter Swarthmore College to continue her work.

It was a case of "like father, like daughter" for Miss Demerec. She hopes to continue the studies in genetics which won her the scholarship and follow in the footsteps of her father, Dr. M. Demerec, head of the Department of Genetics of the Carnegie Institution of Washington at Cold Spring Harbor, N. Y. Dr. Demerec was born in Yugoslavia, and Mrs. Demerec was born in Russia.

Martin

Among Mr. Karplus' relatives are two of the world's most famous refugees from Hitler's conquests, the two German scientists who explained the way that uranium, under neutron bombardment, releases energy by splitting into other elements. They are Dr. Robert Frisch, a second cousin of the Science Talent Search winner, and Dr. Lise Meitner, a more distant relative.

Martin's 20-year-old brother, Robert Karplus, is studying for a doctor's degree in chemistry at Harvard University, and other members of his family have been scientists.

"I'm the 'dope' of the family," modestly asserts the nation's top boy scientist for 1947.

Young Karplus, whose studies of bird populations in New England won him the scholarship, turned down a chance to visit Mt. Vernon during the Institute. He stayed in Washington to observe the birds.

Alternates

Alternates for the $2,400 scholarships are Irene Elizabeth Nagy, Bassick High School, Bridgeport, Conn., and Milton Paul Gordon, Central High School, St. Paul, Minn. They will each receive $400 Westinghouse Science Scholarships.

$400 Scholarships

Other $400 scholarship winners are: Norman Harkey Smith, University High School, Urbana, Ill.; William Lee McLeish, Plainville High School, Cincinnati, Ohio; Gary Felsenfeld, Stuyvesant High School, New York, N. Y.; Herman Bieber, Erasmus Hall High School, Brooklyn, N. Y.; Paul LeRoy Cloke, Orono, Me., High School; and Jerome Martin Eisenberg, Central High School, Philadelphia, Pa.

Mary Addleman, Aquinas High School, Chicago, Ill., and Gustavus James Simmons, Sissonville. W. Va., High School, are alternates for the $400 scholarship awards. They and the other high school scientists among the 40 attending the Institute will receive $100 scholarships.

Mr. Simmons also was awarded the unused scholarship of the late John Taylor Hopkins IV, winner in 1946.

Science News Letter, March 15, 1947

Winners of Westinghouse Science Scholarships

GRAND SCHOLARSHIPS OF $2,400

Demerec, Vera Radoslava, Huntington, N. Y.
Karplus, Martin, Newtonville, Mass.

ALTERNATES

Nagy, Irene Elizabeth, Bridgeport, Conn.
Gordon, Milton Paul, St. Paul, Minn.

SCHOLARSHIPS OF $400

Nagy, Irene Elizabeth, Bridgeport, Conn.
Bieber, Herman, Brooklyn, N. Y.
Cloke, Paul LeRoy, Orono, Maine
Eisenberg, Jerome Martin, Philadelphia, Pa.
Felsenfeld, Gary, New York, N. Y.
Gordon, Milton Paul, St. Paul, Minn.
McLeish, William Lee, Cincinnati, Ohio
Smith, Norman Harkey, Urbana, Ill.

ALTERNATES

Addleman, Mary, Chicago, Ill.
Simmons, Gustavus James, Sissonville, W. Va.
Wilt, James William, Chicago, Ill.

SCHOLARSHIPS OF $100

Addleman, Mary, Chicago, Ill.
Biggs, Marilyn Louise, Mt. Sterling, Ill.
Cooley, Robin, Albany, N. Y.
Hersey, Anne, New York, N. Y.
Self, Cecilia Maud, Bakersfield, Calif.
Semiat, Paula B., New York, N. Y.
Christensen, Dorothy Jean, Eugene, Ore.
Cole, Irwin Harold, Cliffside, N. J.
Cooper, Leon N., New York, N. Y.
Emrick, Donald Day, Waynesfield, Ohio
Gregory, Clarence Leslie, Jr., Greenwich, Conn.
Halverson, Phillip Carl, Los Angeles, Calif.
Haugh, Eugene Frederick, Reedsburg, Wis.
Hayes, John Richard, Clifton, N. J.
House, Herbert Otis, Willoughby, Ohio
Inman, Charles Gordon, Buffalo, N. Y
Kamb, Walter Barclay, Pasadena, Calif.
Kopple, Kenneth David, Philadelphia, Pa.
Mattuck, Arthur Paul, Brooklyn, N. Y.
Maynard, Donald More, Nashville, Tenn.
McKenna, James, Lebanon, N. H.
Pike, John Nazarian, Upper Montclair, N. J.
Radack, Herbert Brahm, New York, N. Y.
Relyea, Douglas Irving, Perry, N. Y.
Rennagel, William Robert, Eden, N. Y.
Shappirio, David Gordon, Washington, D. C.
Simmons, Gustavus James, Sissonville, W. Va.
Taylor, Leonard Stuart, New York, N. Y.
Wilt, James William, Chicago, Ill.
Zemach, Ariel, New York, N. Y.

THE JOHN TAYLOR HOPKINS IV AWARD

Simmons, Gustavus James, Sissonville, W. Va.

Judges: Dr. Harlow Shapley, Dr. Harold A. Edgerton, Dr. Steuart Henderson Britt and Dr. Rex E. Buxton.

Science News Letter, March 15, 1947

TOP TEN—Left too right: Milton Paul Gordon, alternate boy for the top scholarship; the group visits the petroleum division of the Bureau of Standards; Irene Nagy, alternate girl for the $2,400 scholarship. The top winners are congratulated by Dr. Harlow Shapley, Dr. Vannevar Bush and Watson Davis. Some of the group are shown talking with Dr. Alfred Blalock. Winners of $400 scholarships: Herman Bieber, Paul Cloke, Jerome Eisenberg, Gary Felsenfeld, William McLeish, and Norman Smith.

GENERAL SCIENCE

Science for Its Own Sake

Seek knowledge because it is good, Dr. Vannevar Bush urged the Science Talent Search winners at their awards banquet.

➤ SCIENCE is a "regenerative system" which reveals new unknowns with every discovery made and each question answered, Dr. Vannevar Bush, president of the Carnegie Institution of Washington and chairman of the Joint Research and Development Board, told the nation's outstanding high school scientists at the awards banquet of the Sixth Annual Science Talent Search.

Dr. Bush, who headed the wartime Office of Scientific Research and Development, described his philosophy of science.

Urging the science-minded high school seniors to seek knowledge for knowledge's sake, Dr. Bush said the essential condition to science is "an intense, innate conviction that knowledge is good, that knowing is good, and that therefore to increase knowledge by conscious willed exertion of the intelligence is both duty and high privilege."

While practical application of science may seem the most important thing to the general public, the scientist gets his greatest satisfaction from increasing knowledge, Dr. Bush explained.

"In general," he told the Science Talent Search winners, "the knowledge out of which some practical advantage or benefit grows has itself been long in existence before the application is made—and this is true in general even in our own time of skill in applied research for a definite purpose.

"Often, moreover," the scientist added, "new knowledge comes to light at a time and in a way having no relation whatever to possible applications."

Dr. Bush said the human has four great sources of strength on which to draw for his energy to carry on work: reason, imagination, physique and spirit.

"In science the great draft is on reason," he declared.

The scientist also uses imagination in building a new theory, his physique in using apparatus and meeting the strain of long hours of concentration on a problem, and his spirit often has a part in his work, the speaker explained.

Warning his audience that "There are a lot of easier ways of earning a living, and sometimes a more cushiony living, in the material sense, than is the usual scientist's lot," Dr. Bush said, "science for the sake of science" is cause enough for the scientist to pursue his work.

Science News Letter, March 15, 1947

EDUCATION

Colleges Lose Scientists

➤ AMERICAN COLLEGES and universities are losing many distinguished scientists to industry and government, Dr. A. J. Brumbaugh, vice president of the American Council on Education, told the Educational Conference luncheon of the annual Science Talent Institute.

Dr. Brumbaugh and Dr. M. H. Trytten, director of the Office of Scientific Personnel of the National Research Council, discussed peacetime scientific personnel problems.

Terming the equitable distribution of scientists "an especially critical problem," Dr. Brumbaugh said that many scientists who left education during the war to go into positions in government and industry have failed to return to the colleges and universities, "because salaries and other conditions are less favorable in education than in government and industry."

He said that heavy teaching loads are handicapping research in colleges and universities.

The modern scientist, Dr. Brumbaugh declared, must be educated far beyond the laboratory. He must be educated in economics, government, the cause of tensions among peoples of the world, systems of philosophical thought and the ideals that dominate peoples and nations.

"Inasmuch as the day of splendid isolation of the scientist from the practical affairs of society has passed," the educator said, "the scientist must share with the economist, the political scientist, the anthropologist, the philosopher, the responsibility for appraising the social effects of his inventions and discoveries."

Science News Letter, March 15, 1947

FUN WITH SCIENCE—Martin Karplus shows his ornithological records; Rada Demerec, genetic studies; Milton Gordon, synthesis of indole; Clarence Gregory, Jr., molecular weight determination; Irene Nagy, Penicillium cultures; Herman Bieber, electric power plant; Walter Kamb, pothole demonstration apparatus; Mary Addleman, extracts of chlorophyll and dyes; Donald Maynard, collection of insects; John Hayes, homemade spectrograph; Leon Cooper, penicillin-resistant bacteria; Jerome Eisenberg, minerals collection. Read left to right.

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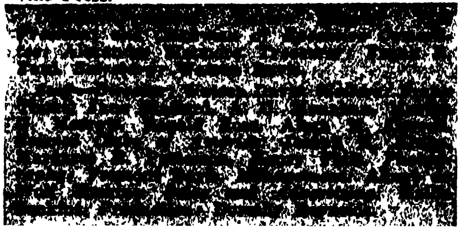


MEDICINE

TB Vaccine Announced

Vaccine made of dead tuberculosis germs has been found to be successful against TB germs in guinea pigs. More studies must be made before it is tried on people.

➤ A NEW KIND of vaccine against tuberculosis is announced by Drs. B. J. Olson and Karl Habel and Bacteriologist Willard R. Piggott of the National Institute of Health of the U. S. Public Health Service.

The new vaccine is as effective against tuberculosis in guinea pigs as the famous BCG vaccine and seems destined to replace the latter and be much more widely used.

BCG, the only other effective vaccine against tuberculosis so far developed, is made of living tuberculosis germs. This has made many medical and health authorities fear to use it, though the germs have been grown in a way to make them lose their disease-producing power.

The new vaccine is made from dead tuberculosis germs. They came from a patient in Tennessee and were a virulent strain. They were killed by ultraviolet light, following a method developed in wartime secrecy by Drs. F. Oppenheimer and S. O. Levinson of Chicago. Because the germs in the vaccine are dead, doctors probably will not hesitate to use it.

Whether it will be effective in protecting humans against tuberculosis is not yet known. More studies of the vaccine will be made before it is tried in humans. For one thing, the scientists want to find out whether it is effective against other strains of tuberculosis germs. So far it has only been tried against the strain of germs from which it was made.

Three weeks after the last dose of the vaccine, the guinea pigs in the experiments were given a huge dose of virulent tuberculosis germs. They all got tuberculosis, but 50% of them survived twice as long as 50% of nonvaccinated guinea pigs given the same huge dose of TB germs. This was as good as the results with a single dose of live BCG vaccine and better than results with a vaccine from heat-killed germs, ultraviolet-killed BCG and three doses of live BCG vaccine.

Why three doses of live BCG vaccine were less effective than a single dose of the same vaccine is another question for which the scientists are now seeking an answer. Details of the tests with the new vaccine are reported in *Public Health Reports* (Feb. 28).

Science News Letter, March 15, 1947

STS Winner Writes

"During the past three years my time has been spent in making intensive studies in ornithology. This branch of zoology attracted me for two reasons—firstly, the possibility that birds offer of observing wild life close at hand during all seasons of the year; secondly, the presence of many intriguing unsolved problems in this field, such as various aspects of migration, range extensions, and life cycles. The work which I have done up to now consists of a systematic study of the class Aves, general observations in field ornithology, and finally an investigation of the life history and migratory status of a certain group of birds.

"All the work in ornithology which I have done up to now has been an introduction to the various aspects of the field and a practical background for college training in genuine zoological research. In the not too-distant future I desire to do some work on what is to me the most intriguing problem in ornithology —the so-called 'orientation ability' of birds. Because of the advance made during the war in such fields as radar and infra-red radiation, many new means of attacking this mystery could be developed and many large-scale experiments could be conducted. With these new research weapons I hope that I may do some small part in finding the answer to this unsolved enigma."—From the essay of Martin Karplus.

MEDICINE

Streptomycin Scores Again

➤ FOUR LITTLE children with tuberculosis of the lungs are apparently getting well after one month of treatment with streptomycin, medicine's newest TB-fighting weapon.

Instead of spending many months in bed in a hospital or sanatorium, waiting for healing to go on, these children have shown improvement after only one month of treatment. Their fever has gone down to normal. Their lungs have improved. They have gained weight. They have escaped the danger of a generalized form of tuberculosis or of having the disease attack the covering of the brain and causing meningitis.

The improvement in these four little patients, whose ages range from seven months to three years, is reported by Drs. Heyworth N. Sanford and Donald E. O'Brien of the Presbyterian-Rush Division of the University of Illinois in the *Journal of the American Medical Association* (March 8).

The children have all continued to improve after the streptomycin was stopped. It is only seven months since the first child was treated, so the doctors probably cannot yet say whether they will be "cured." The streptomycin was given to the children every three hours for 30 days.

Children tend to recover from tuberculosis if they are removed from the home where they were exposed to the disease and placed in good living conditions. But such improvement as these four made could hardly be expected after only one month in a hospital or sanatorium.

The drug which has compressed many months of treatment into one for these small patients was extracted from a mold-like organism found in the soil. Barely three years ago Drs. S. A. Waksman, E. Bugie and A. Schatz of Rutgers University reported that they had succeeded in extracting this chemical and that in the test tube it showed anti-TB action.

Tests by Mayo Clinic scientists on guinea pigs and later on patients with tuberculosis showed it the most promising chemical doctors had ever had for treating the white plague. At first it was available only in small amounts and at a very high cost.

The cost of streptomycin treatment is still high and it is not equally successful in all types of cases. But results such as those reported are giving doctors more and more hope that they are finally on the road to conquest of tuberculosis.

Science News Letter, March 15, 1947

STS Winner Writes

"As one of my scientific projects, I worked on some fundamental genetic principles using Drosophila melanogaster (fruit flies), partly because I wanted to acquire the technique of handling Drosophila for work I shall be doing next summer, and partly because these principles are so important that I want to understand them thoroughly. I got the 'Drosophila Guide' published by the Carnegie Institution of Washington, obtained some flies and was allowed to use space in the laboratory of the Department of Genetics of the Carnegie Institution.

"The books I have read and the lectures I have attended make me realize the scope of the new and growing science, genetics—the endless amount of research on every kind of organism that still should be done.

"During the past summer, I worked as assistant to Professor Th. Dobzhansky from Columbia University, who was doing field work on Drosophila pseudoobscura in California. I am looking forward to the time when my knowledge will be sufficiently broad to enable me to carry on original research which may in some way contribute to our knowledge of living things."—From the essay of Vera Radoslava Demerec.

BOTANY

Students Do Botany Winter Field Work at 10,000 Feet

➤ A HARDY half-dozen botany students at the University of Colorado, together with their young professor and his wife, Dr. and Mrs. John W. Marr, are finding out what happens to mountainside vegetation in midwinter by going out and studying it on the spot despite low temperatures and high winds. One weekend each month, they climb to the University's summer research camp at a 10,000-foot elevation in the Rockies, to make records of winter weather data and observe effects of extreme cold, drying winds, snow burial and other winter climatic factors on the trees, shrubs and Alpine herbs.

Each student works on a separate research project, but they all keep within the same square mile, so that all may make use of meteorological data from the same instruments.

In addition to their botanical work, the six students are also receiving good training in skiing, snowshoeing, firebuilding and other arts of survival under Arctic-Alpine conditions. Dr. Marr is well qualified in this field, having done botanical work in Greenland and the Hudson Bay region.

Science News Letter, March 15, 1947

WHY ONE-SIDED?—Dr. John W. Marr, of the University of Colorado, is studying buds in an investigation of why some high altitude trees grow on one side only.

ENGINEERING

Ocean Oil-Well Problems

➤ DRILLING for oil in the ocean bed 10 miles from the coast presents special problems, the American Society of Mechanical Engineers was told in Tulsa, Okla., by R. G. Watts of the Magnolia Petroleum Company. He described special design features used in a recent drilling.

This company has just drilled a 12,874-foot hole in the Gulf of Mexico 10 miles from the Louisiana coast, the first operation of this nature so far from land, he stated. No production was obtained, but what oil men call "drilling directionally" from a whipstock set at about 10,500 feet is now under way. It is lateral drilling, or sidewise drilling, from the original hole.

Off-shore drilling is nothing new. Many producing wells are found in the waters off California, Louisiana, Venezuela and other coasts. Drilling ten miles at sea requires new techniques, but similar methods will soon be used in drilling two other wells, one 20 miles and the other 29 miles from the Louisiana shore.

The depth of the Gulf where this "ten-mile" well is drilled is 16 feet at low tide. A platform was erected on piles during the past summer at an elevation of 20 feet above mean high water to give protection against high waves. The platform had to be larger than for near-shore drilling because greater space was needed for the storage of drilling equipment, mud, fuel oil, fresh water and standby units. The platform structure was built to withstand a pressure of about 800 pounds per square foot of exposed surface.

Experience gained in drilling this far off-shore well will be valuable in other cases where the ocean bed will be explored for oil in rough Atlantic waters and elsewhere. Geologists predict that petroleum will be found in the continental shelf which projects many miles under the ocean from the southeastern coast of the United States. Underwater explorations are now being made near the Bahama islands some 150 miles from Florida by scientists in diving-bells mothered by surface vessels. They are using so-called gravity and other instruments to determine if probable oil-bearing strata exist below. The final test, however, must be made by drilling.

Science News Letter, March 15, 1947

ENGINEERING

"Three-Speed" Electric Refrigerator Invented

➤ A HOUSEHOLD refrigerator with a large deep-freeze compartment at the bottom, a higher-temperature compartment for the keeping of ordinary prepared foods at the top, and sandwiched between them a smaller compartment for freezing ice cubes, desserts, etc., is covered by patent 2,416,777, issued to E. F. Schweller of Dayton, Ohio, assignor to the General Motors Corporation. The refrigeration mechanism is in the base, and liquid refrigerant is circulated to the various compartments through series of pipes.

Science News Letter, March 15, 1947

MEDICINE

Mold Chemical Checks Undulant Fever Germs

➤ A CHEMICAL from a tan and brown mold found in the soil of a cattle inclosure may become a successful remedy for undulant fever.

Discovery of this chemical is announced by Dr. Grace A. Beal, University of Chicago bacteriologist, in a report to *Proceedings of the Society for Experimental Biology and Medicine* (Jan.).

This disease which humans get from infected cattle and pigs has apparently been on the increase in the United States. Reported cases are 50% higher this year than they were last year. The disease is not often fatal but incapacitates its victims for long periods. Relapses are frequent.

So far, penicillin and similar remedies from molds and other microbes have not been very successful in treating this disease.

The chemical Dr. Beal has discovered comes from a mold, probably belonging to the aspergillus group, which was found in the soil of an inclosure in which cattle infected with undulant fever germs were kept. SD-17 is the only name this mold has so far. When grown in artificial media, the mold is tan on one side and brown on the reverse side.

A small amount of the SD-17 chemical, one part in 64,000 of diluting solution, checks the undulant fever germs in the test tube.

Further studies will be needed to determine whether it can stop the germs in animal and human bodies and whether it is safe to use as a medicine. It has not yet been obtained in pure form, and it may turn out to be the same as another mold chemical, citrinin.

Science News Letter, March 15, 1947

DENTISTRY

Life-Prolonging Diet Pays Havoc With Teeth

➤ A DIET that lengthens the life span and wards off cancer and degenerative diseases nevertheless plays havoc with the teeth.

This finding, which points to a relation between diet and teeth, is announced by a dentist and a nutritionist, Dr. Clifton A. H. Smith of New York and Dr. C. M. McCay, of Cornell University, in the *Journal of the American Dental Association* (March 1).

Rats, not men, were the subject of the studies. The rats from the time they were weaned were kept on a diet so low in calories that they averaged only half the weight of control animals the same age on an unrestricted diet. The rats on short rations, however, lived about 50% longer than the controls. This effect on length of life has led Dr. McCay to advise humans:

"Eat what you should; after that eat what you will but not too much of it."

Kidney diseases, heart disease, tumors and chronic pneumonia did not develop as soon in rats on the unrestricted diet, another scientist reported.

As the retarded rats on the calorie-restricted diet got older, however, their teeth became more and more decayed. In contrast to the findings on the degenerative diseases, such as kidney and heart disease, tooth decay in the rats seemed to be correlated with the period of becoming mature or the establishment of adult body weight.

The fact that the control rats on a non-restricted diet were relatively free of tooth decay points again, the scientists state, to a diet factor that may limit or control tooth decay.

Science News Letter, March 15, 1947

ARCHAEOLOGY

Hawaiian Royal Feather Cape Can Be Seen in U. S.

➤ OO AND IIWI feathers, secured in a net of olona fiber. That was the last word in the ***haute couture*** of Hawaiian society before the coming of the white man introduced mere pants and Mother Hubbard gowns. Only royalty might wear capes made of these rare red, black and yellow feathers.

Four such royal feather capes have been on display at the U.S. National Museum in Washington. They are a new acquisition, bequeathed to the Smithsonian Institution by the late Princess Abigail W. Kawananakoa, of Honolulu. They are beyond all price, for the art of making them is now totally lost.

The collection also includes a number of great wooden poi bowls, carved out of solid timber with stone tools. The largest is 84 inches in circumference and over 15 inches high, with walls less than one-half inch thick. Two of the bowls were once the property of King David Kalakaua, seventh monarch of Hawaii, who died in San Francisco in 1891.

Science News Letter, March 15, 1947

IN SCIEN

ENGINEERING

Electric Heating Unit Keeps Windows Ice-Free

➤ TO KEEP windows clear of snow and ice, C. E. Stroud of Ford City, Pa., and Herman Marini of New Kensington, Pa., build up a series of transparent safety-glass panels, each with an electric heating unit built in along its edges. Their patent, No. 2,416,778, is assigned to the Pittsburgh Plate Glass Company.

Science News Letter, March 15, 1947

NUTRITION

Calorie Need Debunks Pill-Sized Rations Idea

➤ THE ONCE POPULAR notion that a man could get all the nourishment he needed for a day out of a pill-sized ration of chemicals or something approaching that is debunked by latest studies of the Quartermaster Corps.

Unless a man eats enough food to supply at least 1,800 calories per day he cannot retain from his food enough of the proteins essential for nourishment of his body tissues. The necessary proteins could be condensed into a ration of very small size, but the body needs calories from fats and starchy and sweet foods to utilize the proteins. Proteins are ordinarily eaten in meat, eggs, fish, milk and cheese and beans.

"Life raft" rations giving a minimum of food and water for survival over extended periods are the aim of the Quartermaster Corps studies, but they give useful knowledge for such civilian problems as weight-reducing diets and the feeding of starving or semi-starving populations.

Diets deficient in calories, the QM scientists find, cause a pronounced fall in the basal metabolic rate which includes the rate at which the body converts food into energy. This leads scientific support to observations made of underfed persons in Europe and elsewhere, who were able to perform less and less work as the deficiencies in their diet persisted.

The fall in the basal metabolic rate is considered by scientists to be an indication of the effort of the body to compensate for dietary deficiencies.

Science News Letter, March 15, 1947

E FIELDS

PHYSICS

Dummy Rocket to Test Guided Missiles on Ground

➤ A DUMMY ROCKET, actually a "flight simulator," is being constructed in a Yale University laboratory to test on the ground the devices that keep a guided missile in the air on its course.

This dummy rocket will duplicate flight characteristics of a speeding rocket missile may miles above the earth. When it is completed, the guiding equipment to be used in any new type of rocket can be attached and tested in exactly the same maneuvers through which the rocket will be directed after launching.

The control devices, necessary to direct a speeding rocket on a desired course, are complicated affairs. Important in them are vanes which can be manipulated to direct the flow of the escaping jet gases that power the rocket. Changing the direction of this discharge alters the course of the missile.

The flight simulator is being constructed by Yale in cooperation with the General Electric Company's long-range research program at Schenectady. The device will couple an intricate calculating machine with a GE mechanical arrangement driven by electric apparatus known as "servomechanism." With these rapid deductions can be made relative to the complex motion of a missile traveling at supersonic speeds.

Science News Letter, March 15, 1947

MEDICINE

Scarlet Fever Patients Need Penicillin Treatment

➤ ALL PATIENTS with scarlet fever should be given penicillin treatment, four Washington, D. C., physicians advise fellow doctors through a report to the *Journal of the American Medical Association* (March 8).

The physicians reporting are Drs. Harold L. Hirsh, Georgine Rotman-Kavka, Harry F. Dowling and Lewis K. Sweet.

Good results with the mold chemical in treating 136 scarlet fever patients ranging in age from one to 41 years is the basis of their recommendation.

Temperatures fall promptly when penicillin is given, the doctors found. Patients have fewer complications. There are fewer carriers of the disease. The penicillin was given to some by mouth and to others by injection into the muscles every three or six hours.

The fact that it is usually given by hypodermic injection and must be given every few hours constitutes an obstacle to its use, in the opinion of two doctors from the Chicago Health Department, Drs. Archibald L. Hoyne and Rowine Hayes Brown. They report success in treating 116 patients with penicillin.

Chief advantage of penicillin in this disease, they state, is the fact that fewer complications occur when it is used than when patients are given any other kind of treatment.

Science News Letter, March 15, 1947

NUTRITION

German 1550 Calorie Diet Is Semi-Starvation

➤ THE 1,550 calories per day which Herbert Hoover reports is the basic ration for millions of Germans in the American and British zones is a semi-starvation diet as defined by the Food and Nutrition Board of the National Research Council.

Diets providing caloric intakes for men of between 1,400 and 1,700 per day, with intakes for others in the community at correspondingly restricted levels, represent a semi-starvation diet, this group of nutrition authorities has declared.

An emergency subsistence diet, the same group stated, should provide at least 1,900 calories per head per day. For a satisfactory maintenance diet, the board set a minimum of 2,200 calories.

There may be many Americans, however, who do not eat much more than 1,550 calories per day. This is not to say that they should not eat more. Many would probably feel better and stronger if they did. Others may eat 1,550 calories a day or less because they are on medically prescribed reducing diets. Such diets provide large quantities of protein foods, like meat, eggs and fish, in proportion to sweets, starches and fat. They also include plenty of vitamins and minerals.

Science News Letter, March 15, 1947

AERONAUTICS

Psychologists Seek Simple Plane Instrument Panels

➤ PSYCHOLOGISTS are seeking to develop more simple instrument panels for airplanes which will give the pilot all the information he needs with fewer, less confusing dials to read.

The University of Illinois department of psychology and Institute of Aeronautics are cooperating with the U. S. Navy in the project which may revolutionize the instrument panel on planes and help pilots.

The job of the psychologists is to find the easiest and quickest way to tell the pilot the information he needs to know. Starting with a blank panel, the scientists will attempt to design a new system for keeping the pilot informed while he is flying his plane.

New instruments or combinations of present instruments may result, and present dials may be replaced with glowing lights, charts, or even sound signals.

Prof. Alexander C. Williams, Jr., who served as a lieutenant commander in the Navy during the war and is now research assistant professor of psychology at the University of Illinois, will head the psychological work on the new panel. He says modern plane panels have some dials which are difficult to read, some dials which give superfluous information, and some dials which do not tell the pilot enough.

Science News Letter, March 15, 1947

CHEMISTRY

German Chemists Made Synthetic Cosmetics

➤ GERMAN WOMEN had their face creams, perfumes, hair tonics and shampoos during the war, thanks to German chemists.

When foreign raw materials became scarce, or no longer available, these scientists developed substitutes. Many of them were based on synthetic glycol waxes, and oily materials extracted from wool fat.

The methods are no longer secret. American investigators of Nazi war industries have collected the formulas. American manufacturers of cosmetics, and others interested, can get a complete report on German Cosmetics from the U. S. Department of Commerce (Report PB-47526, $3 for microfilm).

Science News Letter, March 15, 1947

AGRICULTURE

Old Fiber Has New Uses

Mechanical difficulties have delayed the use of nature's versatile fiber. Millions of dollars and much time is being spent on ramie's development.

By MARTHA G. MORROW

➤ RAMIE, probably the oldest plant fiber used by man, is one of the most promising of the "new" textile fibers. Perhaps used in wrapping the mummies of ancient Egypt, ramie is today an experimental fiber upon which millions of dollars and man-hours are being spent.

It is not growth of this stingless nettle that is holding back production, but lack of satisfactory mechanical methods for harvesting the plant, separating the fiber from the stems on a large scale and chemicals for cleaning them. Many of these difficulties have recently been ironed out, or show promise of being solved.

Strong Fiber

Ramie, the thin ring of fibers found just beneath the paper-thin bark of the plant, is one of the strongest of natural fibers. It is stronger than cotton, silk and even sturdy hemp.

Ramie absorbs water more readily than cotton. It can withstand torsion better than flax or hemp, but less well than cotton or silk. The fiber is about equal to cotton in elasticity.

When thoroughly cleaned of its natural gums and pectins, ramie's beautiful luster resembles that of silk. It takes dyes well and holds color better than most fabrics.

Banknote paper, typewriter ribbons, bandages, upholstery fabrics and carpet backing are a few of the uses visualized for hard-wearing, shrinkage-resistant ramie. Tire cord and yarn for insulating electrical cables present challenging fields for future operation. Ramie is excellent for use in conveyor belts and industrial fabrics where wet strength is important. Sheets and pillowcases, toweling and draperies are also among the myriad purposes for which this fiber is suited.

Ramie can be spun, woven or knitted on standard textile machinery. It can be used alone or in combination with cotton, rayon or wool. In combination with rayon, for instance, ramie promises a material for shirts and summer dresses that will absorb perspiration easily and dry again quickly.

Unlike various other fabrics, particularly synthetics, ramie is much stronger wet than dry. Its tensile strength is sometimes as much as 60% to 90% higher when wet. The advantage of such a fiber for maritime use is apparent; it makes good cordage, fishing nets and sails.

Today ramie is grown commercially in China, Japan, Brazil and the Philippines. The crudely prepared raw fiber of China is known in international trade as "China grass." Adapted to a semitropical climate with an abundant rainfall on fertile soils, ramie is now being grown experimentally in the United States. About 3,000 acres of ramie are growing at present, but reports indicate more will be turned over to the plant this year. Ramie fiber is just beginning to appear on the market, the delay being partly due to delays in mill construction.

When mature, the plant is a straight stalk six to seven feet high, with few or no branches. From the upper quarter of the stalk grow large heart-shaped leaves. The stems are small, only one-half to three-quarters of an inch in diameter at the butt end.

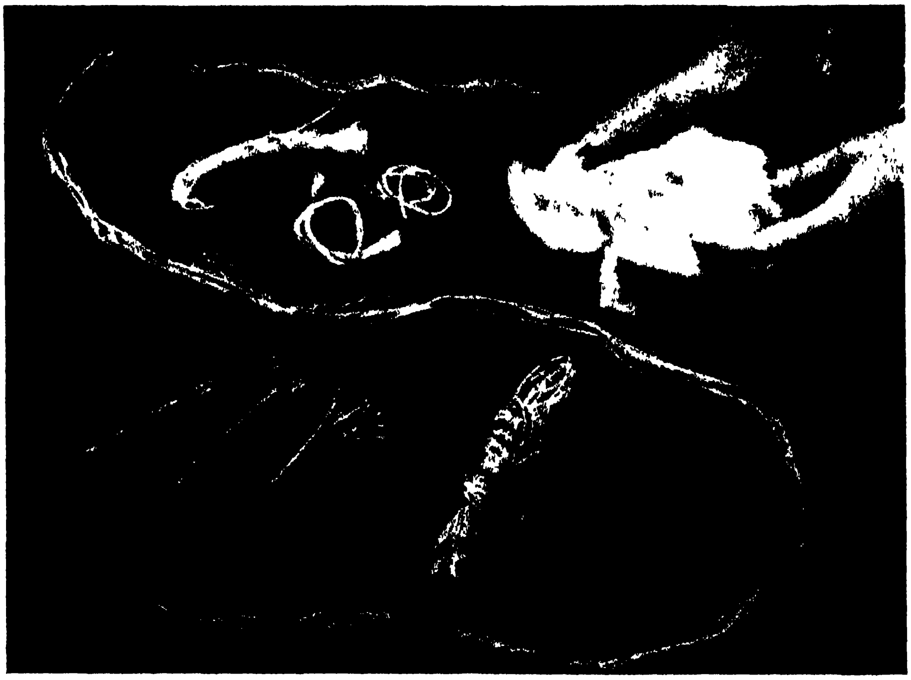
Scratch off the bark and there will be found a thin layer of individual fibers lying directly beneath. Within the ring of fibers is the natural wood part of the stalk. After fraying a few of the fibers loose from one end of a dried stalk, a ribbon of fibers several feet long can be pulled from the stem.

Stem Maturing

When the green stems are allowed to mature, they usually turn brown and begin to seed at the top. If the stalk is allowed to continue to grow past its top fibrous stage, the fibers become coarse and brittle. Knowing when to harvest the stems is important if the fiber is to be obtained at its best, with greatest length and maximum tensile strength.

Ramie is known botanically as *Boehmeria nivea*. It belongs to the nettle family, but does not have the stinging hairs common among nettles. The plant was introduced into the United States about 90 years ago.

Experimental plantings have grown



BEFORE SPINNING—Steps in preparing the fiber for spinning are illustrated by dried ramie stems, ramie ribbon, degummed fiber and fiber cut into two-inch lengths.

best in the muck soils of the Florida Everglades and fertile alluvial stream beds along the Gulf of Mexico. Ramie has also produced well upon fertile, heavily-irrigated soils in the Southwest.

Although ramie can be grown from seed, it is usually propagated from pieces of root. Weeds must be controlled the first year, but after the second year the perennial usually becomes so well established that it crowds out other growths.

Ramie roots send up a new growth each spring. If the stems are cut during the growing season, which extends from April to November in Florida, a new crop immediately begins to grow and may attain a height of five to six feet in about 65 days. Under favorable conditions three or four crops may be obtained each season for ten years or longer.

To collect stems enough for immediate hand cleaning in primitive industries like those in China, ramie has traditionally been harvested by hand. In its natural growth, some of the plants mature before others, and even parts of the same outshoot of one cluster will be of different height and maturity.

Machine harvesting in some cases in the past have resulted in inferior, nonuniform fiber. More recently, however, careful cultivation and fertilization, use of superior ditching, draining and water control, and overall good management has produced a more even, steady growth of plants. This has made mechanical harvesting practical.

Experimental work has been undertaken by the U. S. Department of Agriculture in co-operation with state agricultural experiment stations to develop improved techniques.

Ramie Progress

A number of companies are interested in the cultivation of ramie and are actively trying to improve the plant and its preparation. These include the Newport Industries in co-operation with the U. S. Sugar Corporation, with the largest commercial output, and the Sea Island Mills, Inc. Others interested in Florida developments are Florida Ramie Products, Inc., and Ramie Mills of Florida, Inc.

Ramie fiber may be separated from the rest of the stalk, a process known as decortication, either while the stems are still green or after they have dried out. In the Orient ramie fiber is scraped from the green stems by hand with crude implements, a workman separating only a few pounds of fiber each day. Need of an efficient mechanical cleaner, so that the American industry can compete with cheap Oriental labor, has been one of the important factors holding back greater production of ramie in this country.

Machines Used

Machines designed to mechanically scrape away the bark and woody core from the fiber are of two general types. Large, permanent decorticators separate the fiber from stems grown on thousands of near-by acres, the stems being hauled some distance to the decorticator. But such installations require large financial investments. Transportation cost limits the area of usefulness although large output may offset haulage costs. Huge production machines also often injure the fiber badly.

Smaller, portable machines can be set up in the field where needed. This is an advantage, for not only need the stalks be carried but a short distance to the decorticator or the decorticator brought to the stems, but the green waste can easily be put back in the field, necessitating but slight chemical fertilization to support the next crop of heavy vegetable growth. Portable machines used heretofore, however, handled relatively few stems and called for many man-hours of work.

STRIPPING STALK—A ribbon of ramie fiber is stripped from a green stalk on an experimental field of the U. S. Sugar Corporation.

Since ramie was introduced to this country in 1855, a number of machines have been designed. Many are based on hemp and sisal machines with slight adjustments, others are developed specifically for ramie. Today many new types of decorticator are being designed and difficulties overcome.

Several firms are particularly interested in the end use of ramie, including Collins and Aikman; Sea Island Mills, Inc.; Johns-Manville; and Silver Thread Co.

A large proportion of the ramie fiber is reduced to its ultimate cells, whereas flax, hemp and jute are rarely broken down so far. The ultimate cells of ramie are longer than those of any other plant-yielding fiber utilized in textiles or cordage. They average six to eight inches in

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length, and range from 0.002 to 0.003 inch in diameter.

The natural gums, waxes and pectins of the fiber are removed chemically. The ramie fiber coming from the decorticator is about one-fifth to one-third gum. The gum content of the fiber is next reduced to about four per cent so the fibers will be permanently separated from each other and in good condition for yarn spinning, or the fibers may be degummed at the spinning mill. Chemical processes for degumming ramie are as numerous and complex as the methods and machines for decortication.

The quantity of ramie obtained from an acre varies greatly in the United States. During a good season permitting four cuttings, 30 to 40 tons of green stems and tops have been harvested. But fresh stems may yield only two to four per cent crude fiber, called ramie ribbons.

From 100 pounds of green stalks and leaves containing a high percentage of moisture, 52 pounds of stalks stripped of leaves may be salvaged. When air-dried, the stalks will weigh about 10.5 pounds. Only two to four pounds of decorticated fiber will be gotten from such a harvest, however, resulting in but 1.2 to three pounds of degummed fiber as spun.

Many ramie specialists feel their work is still too much in the experimental stage, and prices and competitive markets too unsettled to make definite predictions about the future of the fiber. But the number of acres planted in ramie is steadily increasing, indicating the faith of those working with this versatile fiber.

A THINGS of science unit containing specimens of ramie and the story of its development to a fabric may be obtained from Science Service, 1719 N St., Washington 6, D. C., for 50 cents.

Science News Letter, March 15, 1947

Atoms, Planets & Stars

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Dr. Albert Einstein Wrote as follows:

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"If you will permit I will try to interest educators in it.

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A. Einstein."

"I have never before seen the various features of the solar system and the earth shown so skillfully."—Dr. M. M. Leighton, University of Illinois.

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7—Twenty of the brightest stars and their distances.
8—Our solar system in a nut shell. Shows our relative distance to other stars
9—Our location in the Milky Way Galaxy, and time to reach nearest star.
10—Curvature of the earth with comparative heights and depths.
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MEDICINE

Plutonism, Atomic Disease, Greys Hair, Causes Cancer

➤ ADD TO THE DANGERS of the atomic age a new disease that causes greying hair, liver damage and bone cancer.

It is called "plutonism" and the atomic bomb element, plutonium, which is poisonous, would be responsible.

Workers in industries using atomic piles for power generation or other purposes will have to be protected against this new disease, just as workers in old-line industries must be protected against lead, mercury and other poisonous chemical elements.

So far as now known, no human being has yet suffered from this disease, but its existence and its effects have been demonstrated through animal experimentation. Dr. Austin M. Brues, of the Argonne National Laboratory (formerly the famous Metallurgical Laboratory at Chicago where the first chain reaction was performed) reported the experiments and the danger to the conference on medico-legal problems sponsored by the Institute of Medicine of Chicago, the Chicago Medical Society and the Chicago Bar Association.

The acute form of plutonism is like the acute sickness that comes when the entire body is irradiated with X-rays or radium. In addition there is gross liver damage and shrinkage of the spleen. When injected into the veins, the chemical is at first concentrated in the liver and spleen and later is transferred within the body to the bones.

Within a year after plutonium is injected under the skin, tumors may appear at the site of the injection. Loss of hair, ulcers, and loss of limbs are other effects.

Reinvestigating radium, Dr. Brues and his associates found that it not only causes bone cancers but also produces heavy calcification of the middle coats of the larger arteries.

Yttrium, radioactive cerium and strontium were among the other dangerous atomic fission products investigated.

Science News Letter, March 15, 1947

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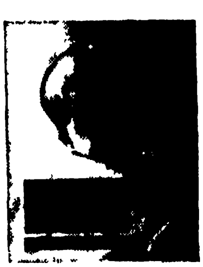

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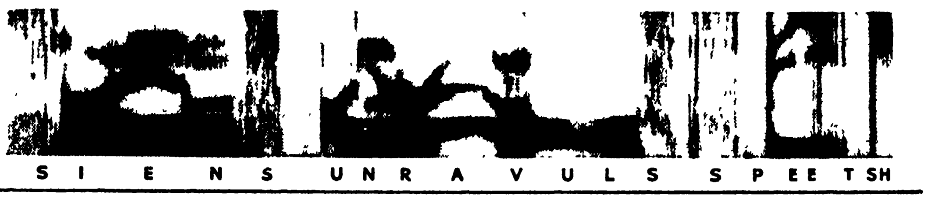
Writing with your voice

Years ago Alexander Graham Bell dreamed of "a machine that should render visible to the eyes of the deaf, the vibrations of the air that affect our ears as sound." He never realized that dream, but his researches led to the invention of the telephone.

Today Bell Telephone Laboratories have turned the dream into a fact — translating the spoken word into readable pictures.

By this new invention of the Laboratories, the talker speaks into a microphone. Vibrations of the voice are unraveled through electronic circuits, and then are reassembled as luminous patterns which travel across a screen. Each syllable of sound has a distinctive shape and intensity.

Visible speech is still in its infancy, and is not yet available to the public. But educators of the deaf are now evaluating it. Indications are that the deaf can learn to read the patterns and, by comparing the patterns their own voices make with the patterns of correct speech, can improve their diction.



Science unravels speech

Patterns of visible speech also provide a means for analyzing and recording sound in the study of phonetics and of languages. Eventually, visible speech may make possible visual telephony for the deaf.

This is but one of many contributions by Bell Telephone Laboratories to the understanding and control of sound.

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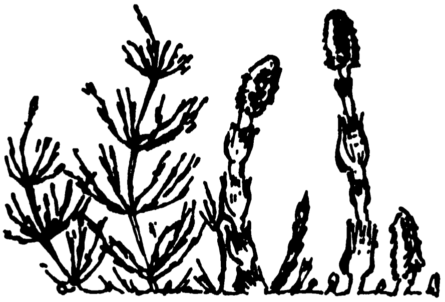
BOTANY

NATURE RAMBLINGS

by Frank Thone



Spring Without Flowers

➤ PUSSY-WILLOWS are sure arousers of spring enthusiasm, alder catkins will be hailed as signs of the winter's ending, even skunk cabbages receive a friendly nod. Yet they are not the only harbingers of spring; plenty of plants that have no flowers to offer us make their early-season bows about now, and are worthy of at least a passing glance when we go for our first spring walks in the woods and fields.

Ferns we are apt to notice. Some hardy species have been with us all winter long, though the cold purpled their leaves. From among this dark foliage, as well as out of the dead and withered last-year leaves of other ferns, rise the fascinating "fiddle-heads" that will uncurl soon into the light green fronds of the new season's growth.

Ferns you are likely to find everywhere, though most of them prefer woodsy or brushy places. Open spaces, where they can get the benefit of full sunlight, are the choice of the ferns' second cousins, the horsetails or scouring-rushes.

For all their kinship to the ferns, horsetails are most un-fern-like in their appearance. Their cylindrical stems rise straight and uncompromising, with whorls of stiff, wiry branches that make them look like small skeleton trees. In one common species, spores are borne in cones on the tips of unbranched stems, while the so-called "sterile" stalks are the only ones that have branches.

Though they may look like little trees, they are trees without leaves. The whorls of branches contain all the plants' chlorophyll and are called on to do the work of leaves. Nor were the horsetail trees always miniatures. Ages ago, when coal was a-making, representatives of their division of the plant kingdom grew rankly to full tree height, and formed dense thickets in the still, damp forests of unrecognizably strange growths. These giants all became extinct, leaving only their meek little relatives to inherit the edges and corners of the earth that are not wanted by better-adapted competing seed-plants.

The second common name of the horsetail, scouring-rush, has survived. the use that once gave it meaning. The very noticeable harshness of the plant's stems is due to their high content of silica. A handful of this harsh herbage is a really effective abrasive or scouring material.

Science News Letter, March 15, 1947

• Books of the Week

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ALLERGY IN THEORY AND PRACTICE—Robert A. Cooke—*Saunders,* 572 p., illus., $8. This survey of the fields of allergies covers fundamentals, diagnosis, and treatment and includes complete etiology, pathology, symptoms, differential diagnosis, and immunology for the more common ones.

THE CULTIVATION OF VIRUSES AND RICKETTSIAE IN THE CHICK EMBRYO—W. I. B. Beveridge and F. M. Burnet—*British Information Service,* Medical Research Council Special Report Series No. 256, 92 p., illus., paper, 70 cents. Containing much information concerning techniques in this field, this report is also an encouragement to introduce virus-work into the classroom.

THE ECHO—Lilia Van Saher—*Dutton,* 252 p., $2.75. This interesting, fast-moving novel by a keen student of psychoanalysis is being widely acclaimed for its scientific accuracy.

HANDBOOK OF THE TREES OF THE NORTHERN STATES AND CANADA—Romeyn B. Hough—*Macmillan,* 470 p., illus., $5.50. A reprint of a standard volume on tree identification; illustrations of the tree together with leaves, fruits or berries, bark, and transverse section of wood.

HISTORY OF MEDICAL THOUGHT—Richard A. Leonardo—*Froben,* 92 p., illus., $2 A thoughtful essay on this neglected phase of medicine, showing the influence of philosophy on medicine throughout the ages.

A HISTORY OF SCIENTIFIC ENGLISH—Edmund Andrews—*Richard R. Smith,* 342 p., $7.50. Although the expressed purpose of this book is to trace the development of scientific idioms, it is also an interesting introduction to the subject of comparative philology.

HOW TO SAIL; A Complete Handbook of the Art of Sailing for the Novice and the Old Hand—Carl D. Lane—*Norton,* 267 p., illus., $3. The numerous diagrams in this beginner's book answer all questions and teach the basic principles of handling sailing craft.

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, Vol. IV, Report of Proceedings July 22-24, 1946—F. J. M. Stratton, ed. —*Cambridge University Press,* 127 p., $1 This series of reports in both French and English deals with the coordination of the activities of various International Scientific Unions and their responsibilities to UNESCO.

MAMMALS OF CALIFORNIA—Lloyd Glenn Ingles—*Stanford Univ. Press,* 258 p., illus., $4. Accounts of all species of mammals found in California, with keys for easy identification, range maps, and accounts of natural history.

MAN IN NORTHEASTERN NORTH AMERICA —Frederick Johnson, ed.—*Published by the foundation,* Vol. III, 348 p., illus., paper, $2. These papers of the Robert S. Peabody Foundation for Archeology discuss environment, culture in various aspects, mythology, linguistics, psychological characteristics and physical types of man in this region.

MECHANISMS OF REACTIONS AT CARBON-CARBON DOUBLE BOND—Charles C. Price —*Interscience,* 120 p., $2.50. This book, the result of a cycle of lectures at the Polytechnic Institute of Brooklyn, represents the first of a series of Lectures on Progress in Chemistry; it reviews and correlates what is known and what is generally believed about the subject matter.

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THE ORGANIZATION AND ADMINISTRATION OF A SPECIAL LIBRARY—Lucille Jackson, ed.—*Special Libraries Assn., Pittsburgh Chapter,* 38 p., paper, 50 cents. Presented at an education course for librarians, this booklet outlines the steps and procedures for organizing an industrial, business, hospital or other type library.

PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY—Luther P. Eisenhart, ed.—*Publ. by the Society,* Vol. 91, No. 1, 136 p., paper, $1.50 Symposia cover America's role in the growth of science, present trends and international implications of science, and problems of international cooperation.

THE RADIO AMATEUR'S HANDBOOK; The Standard Manual of Radio Communication, 1947 ed.—*American Radio Relay League,* 152 p., illus., paper, $1.25. The text has been revised and rewritten in the light of present-day needs as a radio construction manual and training text for class or home study.

ROOT DEVELOPMENT AND ECOLOGICAL RELATIONS OF GUAYULE—Cornelius H. Muller—*Govt. Printing Office,* U. S. Dept. Agric. Tech Bul. No. 923, 114 p., illus., paper, 25 cents. The great interest in guayule as a source for rubber during the critical shortage instigated this report of a special research project.

SUCCESS ON THE SMALL FARM—Haydn S. Pearson—*McGraw-Hill,* 285 p., illus., $2.50. Here is offered a specific program for making a substantial cash profit from a one-man farm of ten or twelve acres so that the farmer may provide his family with the necessities, comforts and minor luxuries of life.

THERE IS NO MYSTERY ABOUT PATENTS—William R. Ballard—*Barrett,* 120 p., $2. In a condensed form, the fundamentals of the American patent system are presented to show how and why this system works to accomplish its intended purpose.

WAR AND HUMAN NATURE—Sylvanus M. Duvall—*Public Affairs Committee,* Pamphlet No. 125, 32 p., illus., paper, ten cents. This discussion of an old problem concludes that the solution to a lasting peace is world-wide education.

WAR STRESS AND NEUROTIC ILLNESS—Abram Kardiner and Herbert Spiegel—*Hoeber,* 428 p., $4.50. This second edition, completely rewritten, of "The Traumatic Neuroses of War" not only provides a systematic presentation of the nature and treatment of the disorder, but is also a contribution to our understanding of the mind in health as well as in sickness.

Science News Letter, March 15, 1947

BACTERIOLOGY

New Antibiotic Isolated From Penicillin Mold

➤ THREE BRITISH microbiologists, C. E. Coulthard, W. F. Short and Robert Michaelis, have isolated a new antibiotic from the same mold that yields penicillin. Their product, covered by patent 2,416,821, has been named notatin.

Science News Letter, March 15, 1947

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❁ *ALARM SYSTEM for frozen-food cabinets warns of rising temperatures before damage results. It is a special bimetal thermostat in electric circuit with a bell or a lamp. The contact remains closed at low temperatures and opens if the temperature rises, causing the alarm to operate.*

Science News Letter, March 15, 1947

❁ *MOIST heat pad for headaches and muscle pains, known as a sinus pack, provides the moisture from its own water reservoir of cellulose material which needs refilling about once in ten hours. In use, a heavy-duty hospital sheeting slip cover protects the wet-proof pad and the patient.*

Science News Letter, March 15, 1947

❁ *PORTABLE dipping tanks, with thermostatic controls, are built on the double-boiler principle. They roll on casters where needed to heat or melt wax, fats, paraffin, pitch, battery compounds and other substances. Heated by gas or electricity, they have a temperature range from 100 to 550 degrees Fahrenheit.*

Science News Letter, March 15, 1947

❁ *ADHESION TESTER, to determine how firmly organic finishes stick to surfaces, is a scratching device, shown in the picture. It is passed over a surface on its own tiny rollers, with pressure increases applied by a threaded sleeve. Adhesion is measured by the pressure needed to expose the base material.*

Science News Letter, March 15, 1947

❁ *ARC LAMP, a completely new one-kilowatt high-intensity projection light for theaters with seating capacity up to 800 persons, is adaptable for use in all standard types of 35-millimeter motion picture projectors. One control adjusts the speed of the automatic carbon feed.*

Science News Letter, March 15, 1947

❁ *HYDRAULIC PUMPS, of the axial-piston constant-displacement type, combine quiet operation with high pressure and high volume. Compact in design, and without thrust bearings, they have a unique two-piece shaft that, it is claimed, absorbs deflection and minimizes bearing wear.*

Science News Letter, March 15, 1947

❁ *COAL PLANER, a unique type found in German coal mines, shaves like a carpenter's plane a 12-inch undercut of coal on a sidewall as it moves along the face of the mine. It loads the debris into cars as it is loosened, and on its return trip loads the coal from the upper part of the face that has caved or been barred down.*

Science News Letter, March 15, 1947

BOOKS

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Question Box

AGRICULTURE

What has delayed the development of ramie? p. 170.

BOTANY

To what is the harshness of the horsetail's stems due? p. 174.

CHEMISTRY

From what did German chemists make cosmetics during the war? p. 169.

EDUCATION

Why are colleges losing scientists to industry? p. 164.

ENGINEERING

How was an oil well drilled in the Gulf of Mexico? p. 167.

GENERAL SCIENCE

From what does a scientist get his greatest satisfaction? p. 164.

MEDICINE

From what does the mold chemical that checks undulant fever germs come? p. 168.

From what is the new TB vaccine made? p. 166.

Is streptomycin equally successful in all types of cases of TB? p. 166.

What is the result of plutonism? p. 172.

NUTRITION

Why can a man not be properly nourished on pill-sized rations? p. 168.

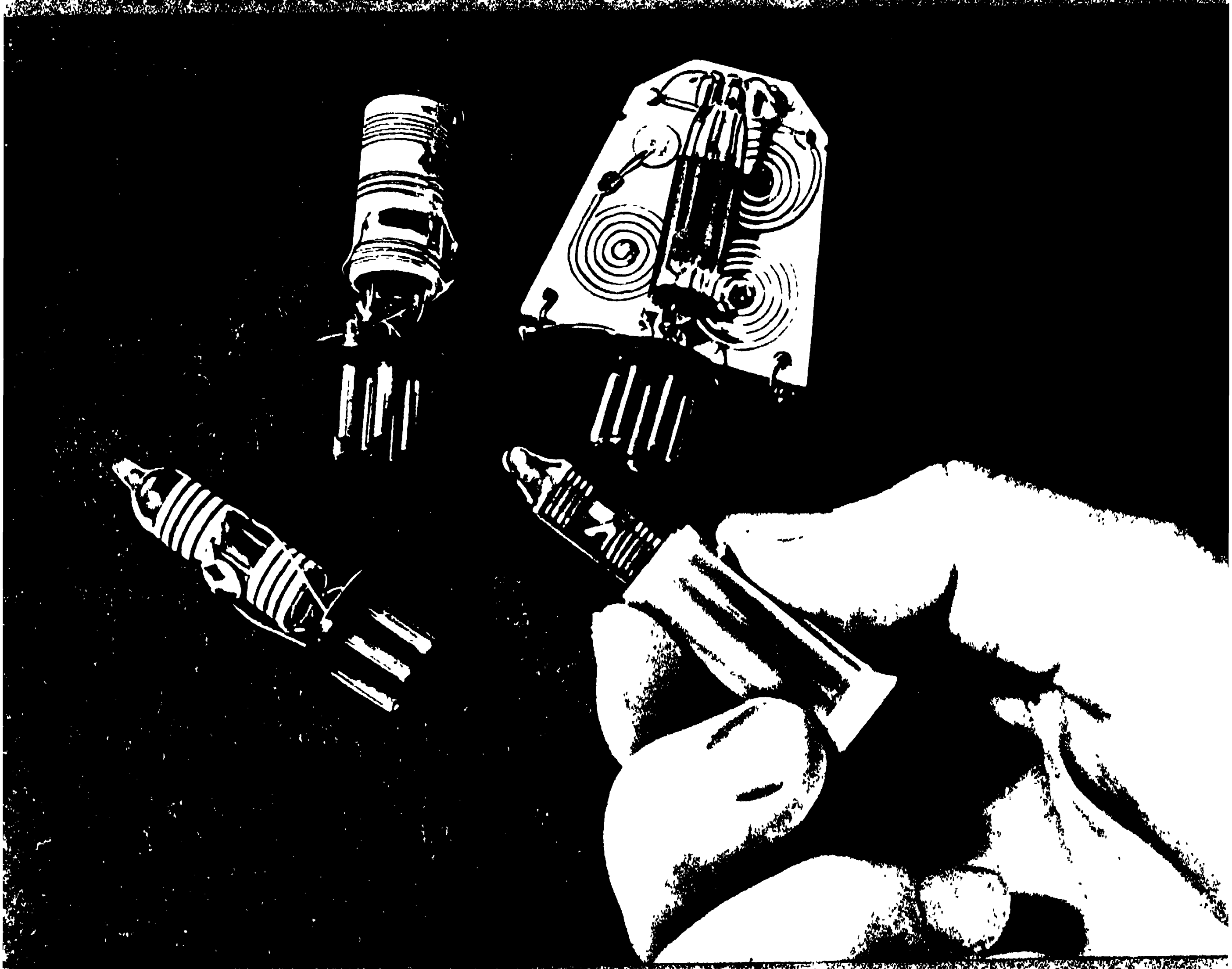
Where published sources are used they are cited.

16 MAY 1947

SCIENCE NEWS LETTER

Vol. 51, No. 12

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 22, 1947



[illegible] Radio of the Future

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A SCIENCE SERVICE PUBLICATION

VETERINARY MEDICINE

Bats Threaten Livestock

Vampire bats, south of the Mexican border, infect livestock with paralytic rabies when they bite them to get blood. All animals can be attacked.

➤ FOOT-AND-MOUTH disease is not the only potential danger to American livestock that lurks below the Mexican border. There is a paralyzing and killing disease called paralytic rabies, known to be carried by vampire bats, which inoculate their victims when they bite them to get a meal of blood. Animals of all kinds may be attacked.

Existence of two colonies of these bats within 300 miles of the Rio Grande, much closer than any previously known, was reported by Charles E. Mohr of the Academy of Natural Sciences of Philadelphia, in an address before the National Speleological Society meeting in Washington. Speleologists are persons who make a special study of caves, natural habitat of bats.

One of the two caves reported by Mr. Mohr is 300 miles from the border; the other, which harbors a smaller vampire-bat colony, is only 250 miles from American soil. Mr. Mohr discovered both colonies while on a cave-exploring expedition in Mexico some months ago. None was found in caves closer to the Rio Grande. However, the species is known to be migratory, and may move closer. Also there is danger of its spreading the infection by biting other bats when the disease drives it mad.

"Control measures," said the speaker, "include vaccination of cattle, screening of human habitations, and destruction of infected bats. It is important, however, that no ill-conceived campaign be carried on against our useful Northern insectivorous bats."

Other diseases known or suspected to be bat-borne include yellow fever, scrub typhus, Chagas' disease, all affecting man, and a tropical trypanosome disease of horses known as murrina.

In the course of his address, Mr. Mohr also made mention of a newly-disclosed war secret, reminiscent of the Old Testament narrative of Samson's destruction of the Philistines' wheat by loosing foxes with firebrands tied to their tails. Only in the modern version, bats bearing tiny incendiary bombs with time fuses were to be released from special containers dropped from bombers. The bats would make for the nearest eaves, and of course start roof fires. The trick actually worked when tried on a dummy village in the West. However, it was not used in combat.

Science News Letter, March 22, 1947

MEDICINE

Constitutional Factor Helps Cause Colds

➤ IF YOU HAVE a cold, as who does not right now, maybe you can blame it on your constitution. Colds are caused by a virus of the germ family, but studies on some 700 school boys who had almost 5,000 colds over a period of years suggest to scientists that a constitutional factor plays an important part in the causation of colds.

The studies were made by Drs. Frederick Sargent, Olive M. Lombard and Virginia W. Sargent at Phillips Exeter Academy and are summarized in the *Journal of the American Medical Association* (March 15).

Each boy tended to have the same number of colds year after year, though there was significant variation from boy to boy in the number of colds each had. For the period of the study, the individual boys tended to vary more than the variation between years. This led the scientists to the view that a constitutional or an environmental factor plays a significant part in the causation of colds. Since the environment at Exeter Academy does not vary much, the constitutional factor gets the blame.

What the constitutional factor consists in is not known, but the scientists suggest further research on this point.

Science News Letter, March 22, 1947

MEDICINE

Anti-Germ Substance Holds Hope Against Diphtheria

➤ DISCOVERY in diphtheria germs of a new anti-germ substance that might become a disease remedy of the future is announced by Drs. J. N. DeLamater and R. J. Goodlow of the University of Southern California School of Medicine.

The discovery almost belongs in the lost and found columns. Through the fortunes of war the new anti-germ substance has been lost and in their report to *Science* (March 7) the Southern California scientists suggest to other scientists a search for it in diphtheria germs they may have in their laboratories.

The anti-germ substance was originally found in diphtheria germs from a human patient which were being used for instruction at the U. S. Naval Medical School. In test tube experiments, the substance checked the growth of a number of germs, including those causing one kind of paratyphoid fever.

With the close of the war, one of the scientists was discharged from the Navy and the studies of the anti-germ substance were interrupted. The diphtheria germs producing it had to be stored for eight months and during this period lost the ability to produce the anti-germ material.

Drs. DeLamater and Goodlow report its existence now because it is apparently the first such anti-germ material discovered in diphtheria germs and if a search is made, it may be found again.

Science News Letter, March 22, 1947

TEXTILES

Non-Woven Fabrics Have Great Strength

➤ NON-WOVEN fabrics, with strength both lengthwise and crosswise, have been recently developed which are finding many household and other uses ranging from tapes to table cloths. Their strength is due to the rayon staple used and to the two directions in which the staple stretches.

In this arrangement of the fibers, the non-woven fabric resembles woven cloths. Non-woven fabrics are essentially multiple webs of rayon or other fibers in which the fibers are bound together by various means. The new type is a development of the American Viscose Corporation in New York, in which the bonding is the result of blending adhesive fibers of cellulose acetate with non-adhesive fibers such as cotton, wool or rayon. Heat and pressure are used to perfect bonding.

In earlier non-woven fabrics, the rayon or other fibers have stretched in one direction as a rule. This gave strength in the direction of the fibers, but less strength in other directions. Rayon fiber is preferred in the new material because its longer length and uniformity impart greater strength.

Science News Letter, March 22, 1947

16 MAY 1947

CHEMISTRY

Aluminum in Banks of Clay

Dr. James I. Hoffman received the Hillebrand prize for developing a practically limitless source of aluminum from clay. Process is expensive.

➤ THE DREAM of making shiny aluminum metal from a clay bank is coming true.

For nearly four years an experimental plant at the National Bureau of Standards has been producing from kaolin clay a raw material which is the practical equivalent of bauxite, hitherto the only practical ore of aluminum.

Dr. James I. Hoffman, government chemist, was given the Hillebrand prize of the Washington Chemical Society as evidence that his colleagues consider his process a major chemical achievement.

There is now no practical limit to the amount of aluminum for a modern world that can be produced. Literally billions upon billions of tons of clay suitable for use in the Hoffman process underlie the southern states alone. It is the same kind of white or cream clay that is used in coating paper and in some ceramic uses.

Only about six years' supply of high-grade bauxite exists in the country according to a wartime estimate. The hurry-up development of a new process was begun as a hedge against the possibility that submarine warfare would cut us off from the British and Dutch Guiana bauxite upon which the U. S. is largely dependent.

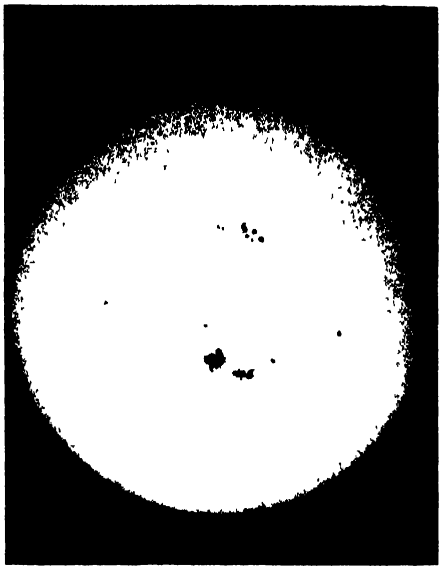
The primary barrier today to the use of clay in aluminum production is cost. To produce clay of the needed purity by the Hoffman process costs about twice as much as high-grade bauxite under present conditions.

In the Hoffman process the clay is first roasted, then digested with dilute hydrochloric acid, next filtered to remove the insoluble silica. The aluminum is obtained as hydrated chloride by adding hydrochloric acid gas. The rest of the process consists of separating and washing the aluminum chloride crystals, heating them to drive off the chloride and then recovering the hydrochloric acid for reuse.

Since it was developed as a government research, anyone will have a right to use the new process.

Dr. Hoffman was given the prize in part because he helped make the atomic bomb by showing how ether could be used to remove the impurities from crude uranium. This is rated a top chemical step in obtaining uranium for the bomb, but less can be said publicly about this work than about the aluminum process.

Science News Letter, March 22, 1947



GIGANTIC—Easily visible through smoked glass, this sunspot grew to be one of the five largest on record. The photograph of the immense pock-mark disfiguring old Sol's face was made on March 10 by Mrs. L. P. Day of the U. S. Naval Observatory.

SURGERY

Frog's Heart Transplanted

➤ MAKING a composite, living body out of two parts of bodies belonging to different animals, neither of which could live by itself, is the possibility seen by scientists in heart transplanting experiments performed by Prof. N. P. Sinitsin of the Gorky Medical Institute in Moscow.

A frog in Prof. Sinitsin's laboratory has now started its second year of new life with a transplanted heart.

"This brilliant experiment," comments Dr. W. Fried for the Soviet Scientists' Antifascist Committee, "speaks not only of the possibility of transplanting hearts to cold-blooded animals but shows that animals continue to live normally for a long time after the operation."

Prof. Sinitsin has devoted the last ten years to the problem of heart transplantation in cold-blooded animals. Two years ago he stated in a report to Science Service that some of the frogs had lived over 100 days with transplanted hearts and did not show any differences in behavior from normal frogs. In the spring both males and females which had been operated on went through a normal nuptial period which ended with spawning.

He has also recorded long life in a number of frogs in which he transplanted hearts of opposite sex.

"Biochemical contrasts are thus seen to disappear and alien hearts adapt themselves to new conditions," Dr. Fried states in reporting Prof. Sinitsin's results.

The success of these experiments, Prof. Sinitsin points out, depends on a proper feeding of the transplanted organs. For instance, diffusive, non-vascular feeding is peculiar to the frog heart.

Science News Letter, March 22, 1947

GEOLOGY

Earth Estimated to Be 3,350 Million Years Old

➤ EARTH'S AGE is about 3,350 million years, according to the newest estimate. It was made by Prof. Arthur Holmes, University of Edinburgh geologist, on the basis of a careful re-examination of radioactive lead ores from some of the oldest rock formations in the world.

Most lead is radiologically inert, but like almost all elements lead has isotopes, or atoms of slightly different atomic weight than the majority, and some of these isotopes are radioactive. They constantly give off atomic particles, and in the course of time become ordinary, non-radioactive lead atoms. From the proportion of these radioactive lead atoms in a given sample of lead-containing mineral it is possible to calculate how long this process has been going on.

Prof. Holmes' newest estimate of the earth's age has been communicated to the editor of British *Nature*.

Science News Letter, March 22, 1947

SOCIOLOGY

Hungry Ruins of Greece

➤ ONCE THE MOST powerful nation in the world, Greece today occupies the world's spotlight as a hungry country with little hope of ever feeding her people.

Main occupation of the 7,000,000 inhabitants of modern Greece is agriculture and the main product is wheat. Yet, even before the country was battered in World War II, the chief products which Greece bought from other countries were cereals and other foods.

About the size of Alabama or North Carolina and shaped a little like Florida with the northern arm reaching east instead of west, Greece is a mountainous country with many lakes and rivers.

Only one-fifth of the land can be farmed, but three-fourths of the people are employed in agricultural pursuits.

Greece will always depend on other countries for her food.

Before the war Greece paid for food with exports of horticultural products such as tobacco and currants. Perhaps her most famous product is olives, which compete with those of other Mediterranean countries on world markets.

Buried in the rough terrain of Greece is a variety of important minerals. But Greece must depend on other countries for coal, and the minerals have not been extensively mined.

The Greek peninsula is one of the leading sources of chromite from which comes the chromium of many types of high grade steel. Other minerals are lignite, iron ore, iron pyrites, magnesite, lead, emery, marine salt and the famous Greek marble.

The invasions and occupation of World War II, while part of the cause for Greece's plight today, are an old story in the history of the country. Since the days of the "Glory that was Greece" 2,500 years ago, probably no area in the world has seen so many wars.

Battered and helpless, modern Greece is built on the ruins of one of the greatest civilizations in history. On these ruins today is one of the toughest problems President Truman and other world leaders must face.

Science News Letter, March 22, 1947

DENTISTRY

Treatment to Check Decay

➤ REGULAR USE of an anti-decay chemical treatment of the teeth of all children is now recommended by the American Dental Association.

The chemical is sodium fluoride. It would be applied by the child's dentist in a 2% solution to the crowns of the teeth twice a year after a preliminary series of at least four treatments for each tooth.

Because sodium fluoride is a poison, the treatment should be given by a dentist who is in position to guard against the use of too strong a solution or other potential dangers.

The treatment is advised as a general preventive measure, but does not have any 100% guarantee that it will prevent tooth decay in all children. It has cut down the occurrence of decay as much as 40%, dentists who have tried it have reported.

The treatment is not effective on the teeth of grown-ups, so far as present evidence goes.

Putting a sodium fluoride solution on children's teeth to protect them against decay follows the discovery made some years ago that children born and raised where the community drinking water contained fluoride had teeth relatively free from decay. In a number of communities, fluoride is now being added to the water supply in the hope of reducing the amount of decay in the teeth of future generations of children. The direct application of the chemical to the teeth has been tried by a number of scientific investigators, but until now dentists generally have not used the method. Even now more study is needed to determine the best frequency and method of using the treatment but results have been good enough so that the dental association is ready to advise all dentists to use it.

The mechanism by which fluorides inhibit tooth decay is unknown. Current theories are that the fluorides provide a protective factor in tooth enamel and that the drug inhibits the growth of acid-producing bacteria believed to be a cause of dental decay.

There is no acceptable evidence, the association has stated, that bone-meal preparations and tablets containing fluorides now marketed as dietary supplements are effective in diminishing the incidence of tooth decay.

Science News Letter, March 22, 1947

CHEMISTRY

Packing Material Resists Corrosive Hydrofluoric Acid

➤ PACKING MATERIAL resistant to the almost universal corrosive hydrofluoric acid, is made by James D. Covington of Dallas out of a mixture of talc and flake graphite. Rights in his patent, No. 2,417,351, are assigned to the Socony-Vacuum Oil Company.

Science News Letter, March 22, 1947

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MEDICINE

Soviet Disease Weapons

Russian scientists are working on prevention rather than cure of mental diseases. They have discovered how muscles respond to nerve impulses.

➤ NEW WEAPONS are being forged in the Soviet Union. They are against mental disease, not human enemies. They consist largely of kindness and understanding.

First hand reports of this and other scientific developments in Soviet Russia are given American scientists by Dr. Stuart Mudd of the University of Pennsylvania in *Science* (March 14).

How muscles are chemically sensitized to nerve impulses transmitted through another chemical is another Soviet scientific discovery revealed in Dr. Mudd's report. The sensitizing chemical is adenosine triphosphate. Small quantities heighten the excitability of muscles and increase muscular contraction. Large quantities have the reverse effect. The chemical is released with every muscular contraction.

Patients with dysentery one day are well the next as a result of a treatment widely used by Soviet doctors. The treatment consists in doses of the germ-eating bacteriophage.

Conditioning for mental health is favored over psychoanalysis by Soviet psychiatrists. People conditioned to kindness, security and group solidarity will not crack mentally, is the Soviet theory. So they start the conditioning treatment in early childhood. Its effectiveness "was illustrated in a remarkable way at the Institute for Pediatrics in Leningrad," Dr. Mudd reports.

During the terrible period of the siege of Leningrad, this Institute of about 2,000 students of pediatric medicine and 1,000 child patients was for months under direct bomb and shell-fire. There were many direct hits and the windows were shattered three separate times. No mental breakdowns of the type labelled neuroses occurred in any of the patients during all this time. The director of the Institute, Dr. N. A. Mendeleva, attributes this to the confidence of the patients in those who cared for them, the calmness of all the staff, and the fact that nothing was ever permitted to interrupt the routine.

The story of the spoon of tears gives some of the spirit of Soviet scientists. Tears contain lysozyme, an anti-germ chemical which is a sort of ancestor of penicillin. Soviet doctors use it to treat nose, throat and eye infections and as a spray in laryngitis. All the best singers are said to insist on it. The lysozyme is obtained from horse-radish and from egg-white. When Dr. Mudd asked one of the scientists, Prof. Ermoljeva, why they did not use the original source of lysozyme, tears, she answered:

"In my institute there are not so many tears. Once I had tears and I remembered lysozyme and tried to catch the tears in a spoon, but then I had no more tears."

Science News Letter, March 22, 1947

PHYSICS

Face Mask, Respirator Save Day's Heat Loss of Calories

➤ A HEAT LOSS equal to the calories from a day's food might be saved by the Army's new mask and respirator now being tested by the Army Ground Forces Task Force "Frigid" at Fairbanks, Alaska, and in the Antarctic.

The respirator follows the principles of good power plant engineering. Engineers will recognize it as a heat exchanger such as is used to recover the heat from gases or liquids before they are discarded up the chimney or down the sewer from power plants.

The power plant in the body of a man exercising moderately at a temperature of 40 degrees below zero Fahrenheit loses heat equal to 1,730 calories in 24 hours in the breath exhaled from the lungs. Food supplying that many calories in a day is enough to maintain a sedentary worker in temperate climates. If the respirator is 100% efficient it could therefore save the equivalent of a day's food supply. Its actual efficiency will be determined from the tests now underway. It showed a "high degree of efficiency" in tests conducted under sub-zero temperatures at the Quartermaster Climatic Research Laboratory at Lawrence, Mass.

The respirator is light, simply constructed and made of soft rubber to fit snugly about the nose and mouth. It is worn partly within and partly outside the arctic face mask. The portion within the mask is held in place by the pressure of the mask. The section outside the mask consists of a cylindrical tube which is filled with metal wool made of copper or stainless steel.

KEEPING WARM—Arctic mask and regenerator save about a day's food in calories as proved by U. S. Army Ground Forces. U. S. Signal Corps photograph.

The metal wool absorbs the heat contained in the vapor expired by the breath and releases this heat to the inspired air. In this way, the upper respiratory tract and lungs of the wearer are protected against extremely cold air and body heat is conserved.

Science News Letter, March 8, 1947

ENGINEERING

Steam Locomotive Powered With Novel-Type Rotors

➤ A NOVEL steam locomotive, with a power plant that is of neither turbine nor reciprocating type, has been patented by Benjamin C. Monroe of Tuscola, Ill. Power-converting elements consist of pairs of rotors, each shaped like a thick-waisted figure-8, meshing into and turning each other like a pair of toothless gears. Several of these, mounted on a common axle, insure a continuous flow of power. The whole set-up is enclosed in a casing that has a figure-8 cross-section.

Science News Letter, March 22, 1947

AERONAUTICS

Fog Clearing Idea Tested

Fog dispersal system tested in Akron airport is not substitute for present landing systems but may serve as approach to lighting system.

➤ THE FOG DISPERSAL system just installed and now under test at the Akron airport is for the purpose of clearing fog from immediately above the landing strip but primarily to determine its usefulness as an approach lighting system.

It is not intended as a substitute for instrument landing systems now being widely installed, but as an aid. These instruments guide planes through heavy overcast and bring them to low altitudes correctly positioned for landing, but for the actual touch, pilots need to see the runway. A fog dispersal system lifts the ceiling over the landing strip, giving clear vision of the paving.

Fog dispersal is not a new idea. The installation in Akron is an improvement over earlier types developed during the war and others developed since. It is a forward step in a system that will lift a fog effectively, and at not too great a cost, and at the same time may serve the other purpose because of the brightness of the flames used to disperse the fog.

The original fog dispersal system was developed in foggy England to enable bombers returning from missions over Nazi territory to make safe landings. In its simplest form it consisted of two troughs of oil or gasoline extending along the sides of the runways, the fuel being lighted by torches. It was called FIDO, short for Fog Intensive, Dispersal Of. The heat created lifts the fog from a hundred to several hundred feet.

In later systems pipes with spaced nozzles were used, and then came electrical methods of igniting the flares when needed by means of a switch located in the control tower. The system in Akron, designed and installed by the Babcock and Wilcox Company, uses fuel oil at an unusually high pressure which assures complete atomization and combustion.

This results in a brilliant flame of large area, having great fog-penetrating effect. The heat created is expected to be sufficient to clear the runway of fog, and it is thought that the fog-penetrating brightness of the flames may serve as an approach lighting system. It is a test unit; pilots landing at Akron will report their observations, and others flying over the port will report on distances at which the light is found to be visible.

Science News Letter, March 22, 1947

PHYSICS-CHEMISTRY

Physicist and Chemist To Receive Franklin Medal

➤ THE SCIENTIST who directed the operation of the world's first chain-reacing pile and an English chemist famed for studies of the life processes of plants and animals are winners of the 1947 Franklin medal of The Franklin Institute in Philadelphia.

Dr. Enrico Fermi, Italian-born leader in the development of the atomic bomb and now a physicist at the Institute of Nuclear Research at the University of Chicago, and Sir Robert Robinson, professor of chemistry at Oxford University, England, will receive the medals April 16, Dr. Henry B. Allen of the Franklin Institute announced.

Dr. Fermi was awarded a Nobel Prize in 1938 for his studies of the physics of the neutron, while the English scientist was knighted in 1939 for his contributions to the field of organic chemistry.

Science News Letter, March 22, 1947

ICHTHYOLOGY

Airplanes Drop Lampblack In Attempt to Save Fish

➤ LAMPBLACK dropped from airplanes is being tested as a means of saving fish from drowning.

The lampblack is to be dropped on ice-covered lakes to melt the ice and permit air to reach the fish in the water below. Each year thousands of fish literally drown when thick ice prevents oxygen from getting to the water.

Strips of lampblack, dusted on the ice, are expected to absorb the sun's rays and melt the ice. The experiments are being tried on larger lakes in Wisconsin by the state Conservation Department after successful trials on small plots.

Russians have used soot to remove snow from fields in a similar project.

Science News Letter, March 22, 1947

MOLECULAR STILL—Powerful enough to "distill" solids and liquids never before vaporized, this still, developed by Gulf, creates a vacuum to evaporate substances into their molecular parts.

CHEMISTRY

Compounds Evaporated By Molecular Still

➤ LIQUIDS and solids never vaporized before yield to a high-vacuum evaporating process which is now being used to determine just what constitutes petroleum.

The equipment used is called a molecular still. It is a five-foot glass tower, in which the vacuum is obtained, with a complex system of electric leads, radio tubes, mercury boiler system, vacuum measuring apparatus, and a series of vacuum pumps. The vacuum obtained has less than one billionth of atmospheric pressure, it is claimed.

Within this vacuum, solids as well as liquids can be evaporated into their various molecular parts: Oils, greases and waxes are divided into several hundred components with a degree of separation never before obtained. These components are made for various tests relative to physical and other properties. Results are expected to be used in refineries in the production of improved petroleum products.

Science News Letter, March 22, 1947

MEDICINE

BAL Hope for Arthritics

Anti-war gas chemical makes gold treatments safer for those suffering with arthritis by relieving poisoning symptoms.

➤ AN ANTI-WAR GAS chemical is making gold salts treatment for arthritis safer. More than that, it may lead to even better treatment for rheumatoid arthritis.

This newest hope for arthritics is BAL. The letters stand for British Anti-Lewisite. Chemically, it is a kind of alcohol, 2,3-dimercaptopropanol. Designed by British chemists to save soldiers in case of gasing with arsenic-containing lewisite, BAL turned out to be a life-saving remedy for victims of bichloride of mercury and arsenic poisonings.

Some arthritis patients have been helped by gold salts, but gold, like mercury and other heavy metals, is a poison. The gold salts treatment was dangerous because it was hard to gauge a dose that would help the patient but not poison him.

BAL has been given to a dozen patients suffering from gold poisoning following gold salts treatment for arthritis. In all but one the poisoning symptoms were relieved. In that one, the rash and itching was not affected by the BAL treatment. Two of the patients were seriously ill. "Spectacular recovery" occurred in each of these cases.

Details of this new use of BAL are reported in the *Journal of the American Medical Association* (March 15) by three groups of physicians: Drs. Abraham Cohen of Philadelphia, Joel Goldman of Lewistown, Pa., and Alfred W. Dubbs of Allentown, Pa.; Drs. Charles Ragan and Ralph H. Boots of New York; and Drs. L. Maxwell Lockie, B. M. Norcross and C. W. George of Buffalo.

Hope of an even better treatment for arthritis appeared in the report by Drs. Ragan and Boots. BAL, they found, seemed to cause an earlier relapse of the arthritis in patients who had been free of the disease temporarily following the gold salts treatment. Since BAL acts by reactivating certain enzyme systems in the body which have been poisoned by heavy metals, the gold salts apparently achieve their remedial effects by temporarily suppressing processes which cause activity in rheumatoid arthritis. The New York scientists do not elaborate the point but it suggests that scientists may see in this work a lead to better understanding of arthritis and better treatment for it.

Science News Letter, March 22, 1947

BIOCHEMISTRY

Tomato Juice Knocks Out Athlete's Foot Germs

➤ GERMS of athlete's foot can be knocked out with tomato juice. Not the red kind that comes in cans, but the juice pressed from leaves and stems of the tomato plant, chemically freed of its green coloring-matter and concentrated. The active principle has been named tomatin.

This discovery was made by three U. S. Department of Agriculture scientists, working at the Department's great experiment station at Beltsville, Md. The men are Dr. G. W. Irving, Jr., Dr. T. D. Fontaine and J. W. Wood.

Besides the athlete's-foot fungi, tomatin has been found effective in stopping the growth of various other fungi and parasitic yeasts that cause disease in human beings and animals, including the fungi that produce skin and scalp ringworm. All tests conducted there have been on cultures of the organisms themselves, in glass vessels. Clinical tests on actual human cases are now in progress at Duke University Medical School.

Tomatin was discovered about a year ago, as a result of a search for the reason why some tomato plants are resistant to fungus disease attacks and others are not. It was abundant in resistant plants; susceptible ones had little or none of it.

Since then, tomatin-like action has been obtained from the leaf juices of potatoes and green peppers, which are botanically related to tomatoes, also in the juices of cabbages and sweet potatoes, which are not. Juices of numerous other garden plants have also been tested, but have shown no activity.

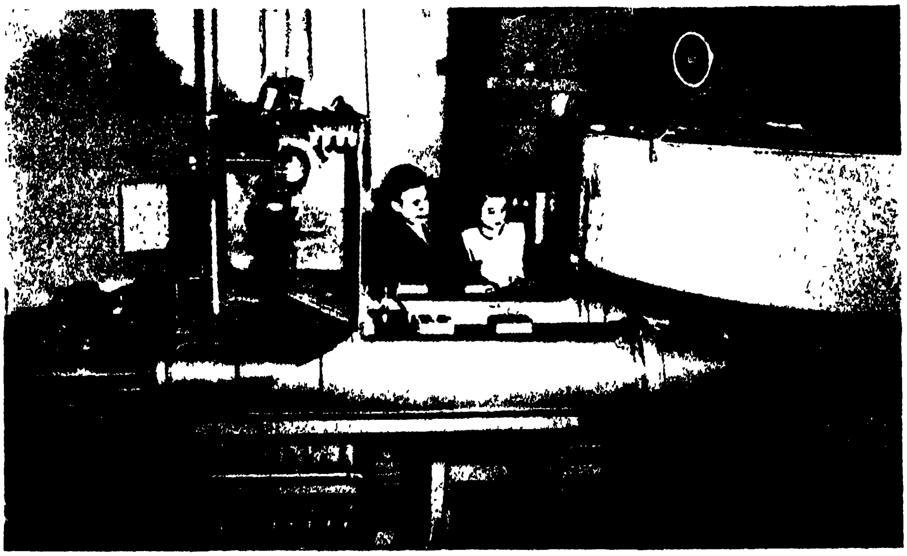
Science News Letter, March 22, 1947

TEXTILE CHEMISTRY

Impregnated Fiber Is Like Silk-Coated Cotton

➤ WHAT IS in effect silk coated cotton is provided in a process on which Thomas C. Whitner of Elizabeth, N. J., has obtained patents 2,417,388 and 2,417,389. He impregnates the cellulose fibers with a chemical mixture in which silk has been dissolved, then removes the chemical vehicle in an acid bath, finally rinsing out all residues with water.

Science News Letter, March 22, 1947



THIRD LARGEST CYCLOTRON—Just placed in operation at the University of Pittsburgh, this atom-smasher provides 200,000-volt "pushes" for the ions circulating in the vacuum chamber, seen between circular tanks at right. Tanks contain 18 miles of copper coiled about magnet poles and cooled by 467 gallons of cyclotron oils developed by Gulf Research.

GENERAL SCIENCE

Dr. E. E. Day Tells House Committee of Science Need

➤ SPEAKING for 68 scientific and educational organizations, President Edmund E. Day of Cornell University, chairman of the Inter-Society Committee on Science Foundation Legislation, told the Interstate and Foreign Commerce Committee of the House, "We need a National Science Foundation to help provide facilities and to help train scientific workers to use them."

He declared the Foundation should:

1. Provide for the support of basic fundamental research without reference to the development of immediate practical applications.
2. Be free to investigate problems in any scientific area and by any appropriate method.
3. Provide for the training of young scientists.
4. Coordinate scientific research and the development and utilization of scientific personnel.

Dr. Day said scientists were more concerned over the caliber of the men chosen to head the foundation than the administrative setup for the organization.

"It is our feeling that the bill should not be so specific in details of procedure and organization as to hamper the administration in carrying out the objectives of the foundation," he told the committee.

Science News Letter, March 22, 1947

ELECTRONICS

EDVAC II to Calculate Census for Government

➤ WHEN THE CENSUS-TAKER next comes around, the chances are that the numerical facts you give him will be fed to EDVAC II, successor to ENIAC. The U. S. Bureau of the Census has just placed, through the National Bureau of Standards, a contract for the construction of one of these newest of all electronic computers that can out-Einstein Einstein.

ENIAC, which has just been completed, has already been made at least slightly obsolescent by EDVAC I, now under construction, because of its greater compactness and simplicity. And already newer and better EDVACS are promised by the creators of this family of robot lightning computers, Dr. John Mauchly and J. Presper Eckert, Jr.

Outstanding feature of these mechanical mathematicians is a tank of mercury in which they "remember" data that have been fed into them, and when they are ready, on proper electronic signal, to deliver what they "know." They can also modify the contents of their mercury memories upon receipt of later instructions.

The EDVACS, as well as their older brother, ENIAC, are produced by the Electronic Control Company of Philadelphia.

Science News Letter, March 22, 1947

CHEMISTRY

Industrial Chemistry Finds New Uses for Fats

➤ FATS, though at present in short supply, are likely to pile up into surpluses in normal times, and therefore challenge industrial chemists to find new and profitable uses for them, Dr. Anderson W. Ralston, chief research chemist of Armour and Company, told an audience of his colleagues in St. Louis, after he had been presented with the Midwest Award of the American Chemical Society.

Until relatively recent times, about the only non-dietetic use for fats was in the production of soap and glycerin. Since glycerin constitutes only about a tenth of the total mass of fat, and fatty acids the other nine-tenths, the big problem is to find some use for fatty acids other than in soap.

One new way of making fatty acids useful is to combine them, at high temperature, with ammonia, which results in the formation of a group of compounds called nitriles. These have many economic applications.

Some of these compounds, especially lauronitrile, while odorless to human beings, seem to smell very bad to insects. Hence they can be used effectively in insect repellents.

Nitriles are also used as plasticizers for a variety of polymers, and their derivatives find wide uses as promoters of reactions in numerous industrial processes. Salts of amines derived from nitriles can be used in waterproofing building materials. These salts are also used in flotation processes for separating valuable from useless constituents of minerals, especially in preparing potash and phosphate fertilizers. Salts of amines with heavy metals have valuable disinfectant properties, and have found uses ranging from protection of seeds against fungus attack to preservation of iced fish during long-distant shipment.

Science News Letter, March 22, 1947

IN SCIEN

ORNITHOLOGY

Smallest Owls on Earth Found in California

➤ CALIFORNIA'S admitted penchant for claiming the biggest things on earth has gone into reverse: a pair of the smallest owls on earth, hitherto not known west of the Colorado river valley, has been found in the Joshua Tree National Monument, about 125 miles due east of Los Angeles, by two zoologists of the University of California at Los Angeles, Dr. Loye Holmes Miller and A. J. Van Rossem.

Known as elf owls, the little gray-brown, yellow-eyed birds are only about two and one-half inches long—rather smaller than most canaries. They have been known previously only from the desert country east of the Colorado river valley, where they nest in abandoned holes drilled by woodpeckers in the giant tree-cactus, or sahuaro.

Science News Letter, March 22, 1947

MEDICINE

Better Artificial Arms, Legs, Made for Veterans

➤ TWENTY THOUSAND veterans and 65,000 war workers will soon walk more easily and be able to use their hands and arms more skillfully and easily with the aid of new and better artificial arms and legs developed through two years' research by American surgeons, physicists and engineers.

The new and better artificial arms and legs are now ready for large-scale production and distribution, Dr. Paul E. Klopsteg of Northwestern University, chairman of the National Research Council's committee on artificial limbs, announced recently.

A set of artificial arms that a person with both arms amputated above the elbow can fasten to his body without assistance is one of the developments.

An artificial forearm with a wrist that will rotate in a 180-degree arc when the forearm stump is turned in an arc of only 70 degrees is another development of American research engineers.

Science News Letter, March 22, 1947

E FIELDS

OPTICS

Optical Glass Cleaned By Electron Bombardment

➤ CLEANING GLASS by bombarding it with electrons is something new. It is a method of preparing optical glass for television mirrors before the reflecting fine film of aluminum is applied.

This new optical-glass-cleaning process, which will have many other applications, is a development of Bausch and Lomb engineers, one of whom described it at the recent meeting of the Optical Society of America.

The process is carried out in a vacuum. The ground and polished optical glass is placed in a metal holder within a high vacuum bell, and bombarded with electrons from a tungsten filament similar to those used in ordinary electric lights. When the filament is heated by the electric current, the electrons are given off. Electrically, they are negatively charged particles, and they are attracted with force to the metal holder of the glass and to the glass.

Thus attracted, the electrons bombard the glass at a speed of several thousands of miles a second. They clean the glass of all moisture and other materials. After cleaning, the glass, still left in the vacuum chamber, is coated with aluminum by an evaporation process. In this, microscopic particles of the metal are evenly distributed on the glass in a very thin film.

Science News Letter, March 22, 1947

PHYSICS

Microscope Attachment Photographs Specimen

➤AN ATTACHMENT for electron microscopes, which enables the observer to watch and photograph changes in a specimen as its temperature changes, is covered by patent 2,417,213, issued to Robert G. Picard of Collingswood, N. J. It consists of a heating lamp in a cylindrical housing, to be thrust in through an opening in the electron microscope tube near the specimen, which will be heated by radiations focussed through a lens. Rights are assigned to the Radio Corporation of America.

Science News Letter, March 22, 1947

MEDICINE

Paralysis of Alcoholics May Be Due to Arsenic

➤ THE PARALYSIS that alcoholics with polyneuritis get may be due to arsenic, not alcohol. Studies suggesting this are reported by Drs. Madelaine R. Brown and Jane L. Hastings of Boston in *Science* (March 7).

The signs and symptoms of arsenic polyneuritis are so similar to those in alcoholic polyneuritis that the doctors decided to investigate the possibility of arsenic being the cause in both kinds of polyneutritis. Fourteen patients with alcoholic polyneuritis were consistently excreting significant amounts of arsenic. Alcoholics who did not have polyneuritis and patients with polyneuritis not due to alcoholism did not excrete more than an occasional trace of arsenic.

The arsenic is not normally present in the body but is taken in with the food. It is possible, the doctors suggest, that the alcohol affects the storage of the arsenic which in turn contributes to interference with enzyme action in these already malnourished patients.

Science News Letter, March 22, 1947

MEDICINE

Ticks, Bedbugs, Fleas Spread Undulant Fever

➤ ONE OF THE MYSTERIES of undulant fever, serious incapacitating ailment which man gets from cattle, goats and swine, may have been solved in experiments by Dr. Raul M. Tovar of the Institute of Health and Tropical Medicine in Mexico City.

Ticks, bedbugs and fleas, he has discovered, may spread the germs of this disease.

Men, women and children may and often do get it through contact with infected cattle, goats and swine, or by drinking raw milk from infected cows or goats or eating ice cream made from raw, unpasteurized milk and cream.

Occasionally, humans get it without having had contact with infected animals or having consumed raw milk. How they get it in such cases has not previously been known.

In studies leading, apparently, to solution of this mystery, Dr. Tovar put ticks, bedbugs and fleas on guinea pigs and, mice that had undulant fever germs in their bodies. The ticks, fleas and bugs became infected, getting the germs as they fed on the infected laboratory animals. When they fed on healthy guinea pigs and mice, they gave the germs to these animals.

Bedbugs from bedsides of undulant fever patients in Mexico City and ticks from a region in the state of Guanajuato where the disease occurs rather frequently were found to be infected with the germs.

The pests which were found naturally infected with the germs probably play an important role, Dr. Tovar states, in transmitting the disease from animals to humans and in conserving it in nature. In his report to the American Journal of Veterinary Research (Jan.) he states:

"The finding of naturally infected ticks justifies the complete cleaning of animals besides separating infected cattle to effectively control bovine brucellosis (the disease in cows)."

Science News Letter, March 22, 1947

MEDICINE

Urethane Is Hope For Leukemia Treatment

➤ NEWEST HOPE for a chemical treatment of leukemia, deadly cancer-like disease of the blood, is urethane, or ethyl carbamate.

In trials on mice and human patients this chemical gives as good results as X-rays. The tremendously high white blood cell drops to normal, the enlarged spleen and lymph glands are reduced in size.

Relapses, unfortunately, occurred in both mice and humans treated with the chemical. Some of the mice, however, held the improvement for almost two weeks after the urethane treatment was stopped. This is a relatively long time in mouse leukemia. The human patients have been treated too recently for doctors to know whether the treatment will prolong their lives. The chemical treatment has the advantage over X-rays in that it can be given by mouth, though in some cases it had to be stopped because of the nausea it caused.

Details of the mouse experiments are reported by Drs. Ruby M. Engstrom, Arthur Kirschbaum and Harry W. Mixer, of the University of Minnesota Medical School, in *Science* (March 7).

The human patients were treated by Drs. Alexander Haddow, Edith Paterson, Inez Ap Thomas, and Jean W. Watkinson in Manchester and London, England. Results were reported in the English journal, *Lancet*.

Science News Letter, March 22, 1947

RADIO

Lipstick Tube Broadcasts

Radio station fits into a lipstick tube and the receiving radio is on a tiny card. Many changes in radio are predicted from miniature developments.

By RON ROSS

See Front Cover

➤ Watch for these:

A radio on a plate the size of a calling card.

A broadcasting station with most of its components small enough to fit into an empty lipstick container.

Cheap, easily-changed plug-in assemblies for bigger home radios.

Ordinary phone calls put through more than 100 times faster.

Hearing aids a fraction of their present size.

"Printed Wire"

All of these are coming along with even more important developments made possible with "printed wire," sub-miniature tubes and midget batteries.

Thanks to these new achievements, you will be able to broadcast from your own tiny radio station combining the "calling card radio" and the "lipstick broadcasting station." Dr. Cledo Brunetti, an electrical engineer at the National Bureau of Standards in Washington, has broadcast with the midget station and heard programs on the card-size receiver.

The personal broadcasting and receiving station will fit easily in a man's coat pocket or in a corner of a woman's handbag.

Your powerful home radio of the future may be made up of assemblies which plug in like modern radio tubes. Instead of the complicated wiring in your present radio, simple plug-in units will be used for easy repairs. There may not be any wires in tomorrow's radio.

A new hearing aid, using sub-miniature tubes and flat, printed circuits, is one inch high and two and one-half inches long, complete except for the batteries and ear attachment.

The time it takes to ring your number when you dial your phone can be reduced to one one-hundred-and-thirtieth of the present time with a small "memory" circuit which may be fitted in the ordinary handset. The tiny circuit would transmit information to the central office one-tenth of a second after you lift the phone.

These revolutionary developments in radio and electronics, some of which may be on the market in a few months, are being developed from a World War II achievement. Thousands of complete radio broadcasting and receiving stations were shot from guns and operated successfully to bring down enemy planes.

Scientific Achievement

The radio proximity fuze, also known as the VT (for variable time) fuze, ranks second only to the atomic bomb as a wartime scientific development. The fuze exploded anti-aircraft shells at the moment when they would do the most damage to enemy planes.

Small enough to fit into a few cubic inches, the tiny radio stations had to be rugged enough to be shot from guns or dropped thousands of feet in bombs. With its tiny radios, the proximity fuze increased the effectiveness of anti-aircraft batteries of the Allies in several crucial struggles during the war. In peacetime, the processes which made it possible to cram a radio station into a shell fuze may revolutionize manufacturing techniques and bring countless new conveniences.

Silver Ink

The tiny radios and broadcasting stations of the proximity fuze used "printed wire." Instead of copper wires, such as those used on your radio, flat lines of silver ink, a solution of fine silver or silver oxide, were stencilled on a small ceramic plate. Another stencil operation used a carbon solution to "print" on the resistors. Tiny tubes were soldered onto the flat circuit and small batteries supplied the power for the tiny radio.

That was the proximity fuze. Since the war ended, Dr. Brunetti and his associates in the Ordnance Development Division of the Bureau of Standards have developed new processes for "printing" wire and other materials have replaced the ceramic plate.

The "calling card receiver" has circuits painted on a plastic card two by five inches. Two inches are turned under to produce a radio two inches wide and three inches long. It has four tiny tubes.

One Inch Tubes

Radio tubes have been developed which are one inch long and only one-eighth of an inch in diameter. These lie flat on the plate as soldered onto the "printed" circuit, instead of standing upright as the tubes do in your radio.

Power for the portable, card-type receiver comes from small batteries, thus far the largest part of the equipment. But scientists and battery manufacturers are at work on even smaller power producers than the tiny hearing aid batteries Dr. Brunetti uses in showing his radios.

The pocket radios will be embedded in a clear plastic for protection. A special plastic, known as NBS (for National Bureau of Standards) Casting Resin, has been developed especially for the miniaturization program.

Plastic Protection

Transparent, it is a lightweight plastic which guards the radio against shock or weather. "Potted" or embedded in this clear plastic, your pocket radio will be able to withstand rough treatment.

The plastic-enclosed radio can be tuned several ways. There probably will be no dial. A flat strip of metal which can be slid through a grooved slot or even a pin-like piece of metal may be used.

For less than you pay today for repairs on a small radio, you will be able to buy a new one. But a radio protected from shock and weather will not need to be replaced very often. It is more likely to be lost than damaged.

Dr. Brunetti's lipstick broadcaster is even smaller than his receiver. Instead of printed wire on a flat surface, the one-tube broadcasting unit has the circuits painted on the surface of the tube.

He uses hearing aid batteries and a standard portable microphone. A lip microphone may be most convenient for personal broadcasting.

Personal broadcasting will be like the

BROADCASTING AND LISTENING—Complete radio broadcasting station is held in the left hand of Dr. Cledo Brunetti of the National Bureau of Standards while a four-tube radio receiver is in his right.

party line on a rural telephone, Dr. Brunetti explains. When you want to broadcast, you will tune in and see if the line is busy. The Federal Communications Commission, which has the job of controlling American broadcasting, has indicated that it will open the frequencies between 460 and 470 megacycles for this type of broadcast.

When an airplane crashes into a mountain in the future, a survivor may call for help and guide rescue parties with broadcasts from a station in his pocket. Today's radios aboard planes are generally destroyed or put out of order by a crash. The pocket unit, developed from radios shot out of guns in the proximity fuze, will be more likely to survive a crash than humans.

Aid for auto wreck victims may be summoned by pocket radios; sportsmen and explorers can call for rescue parties with pocket broadcasting stations. Doctors will have personal pocket radios to summon them. Police will probably be among the first to utilize the small radio units.

Personal Broadcasting

Less urgent, but nonetheless convenient, will be your own, non-emergency use of personal broadcasting. If you get a flat tire on the way home from work, you can tell your wife to delay dinner. And there are countless other times when you can use broadcasting.

Even more important than tiny radios and personal broadcasting may be the revolution in radio and electronics manufacturing which will follow use of the "printed wire" technique and diminutive equipment being developed.

Cost Reduction

Printing wire circuits reduces the cost of wiring 30% to 60%, explains Dr. Brunetti. And wiring, he adds, is a big chunk of what you pay for a modern radio. By stencilling a circuit on a plate, a single worker can turn out perhaps 5,000 circuits for radios in a day. The same worker would probably be able to complete the conventional wiring on only 10 radios.

Many important electronic developments during and since the war have failed to come on the market as soon as the public had hoped. Part of the difficulty is the size of the units. This is particularly true of aviation equipment, and one answer may be sub-miniature tubes and printed wires. With the miles of wire printed and tiny tubes soldered to the flat circuits, greater use may be made of some important electronic developments.

In the proximity fuze, stencils over plates of steatite, a hard, dense ceramic material, were used in printed wire. Since then, experimenters at the Bureau of Standards have devised five more methods. In addition to the stencils and variations such as painting, other tested methods of applying the circuits are spraying, a chemical method adapted from the process used to silver mirrors, metal sputtering or evaporation, engraving, and electrophotography.

Steatite is only one of many materials which can be used as a base for the lines of a printed wire circuit. Any insulating surface will do the job. Electronic circuits can be printed on glass, porcelain, plastics, paper and many other materials.

Pocket radios can even be built into the pocket of the future, because circuits can be printed on cloth.

Reporting that the Bureau of Standards has been flooded by inquiries from industry since he displayed his tiny radio and broadcasting sets, Dr. Brunetti believes many commercial uses for printed wire are coming soon. Globe-Union, Inc., Milwaukee, Wis., holds some patents on the process which it helped develop for the proximity fuze, but much of the research on printed wire is being patented by the Bureau of Standards and will be available to any manufacturer. Some of the basic patents on the printed wire actually date back a century and are now available anyway, Dr. Brunetti reports.

With a receiver and broadcasting station in your pocket, you may soon be able to turn off a bad radio program and air your own program, thanks to tiny equipment devised to make shells explode when they would do the most damage to enemy planes.

Science News Letter, March 22, 1947

CHEMISTRY

Atomic Commission Revises Price List for Isotopes

➤ THE ATOMIC Energy Commission has revised its price list for the radioisotopes which it sells for scientific research. Some of the isotopes have dropped sharply in price while others are up, under a new system which charges on the basis of space occupied by the material instead of neutrons absorbed by the material.

The important radioisotope carbon 14 has been reduced from $367 per millicurie, the unit of measurement used in the sales, to $50. Phosphorus 32 and iodine 131, other frequently used isotopes, remain the same price.

Under the new charges, radiogold goes up from $7.36 to $12, while the more expensive radiosilver drops from $121.30 to $33.

Reporting that 466 orders for the radioactive byproducts have been processed, the Commission said it is charging only a portion of the actual operational and overhead costs. The tiny research tools are produced at the uranium chain-reacting pile of the Clinton Laboratories in Oak Ridge, Tenn.

Science News Letter, March 22, 1947

LEARN PORTRAIT PAINTING AT HOME

• Previous art training or talent NOT necessary. This new Stuart System teaches you, in 11 simple, easy-to-follow lessons, to make *exact* charcoal and oil likenesses. Guidance for your every step. Send for free book *today*.

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Do You Know?

Dry *wines* are made from grapes of high acid and moderate sugar content; sweet wines of grapes with high sugar content and moderately low acidity.

Beeswax and castor oil are the principal materials in many *lipsticks;* other oils and waxes are added to regulate hardness and oiliness.

The average octane number of premium-grade motor *fuels* sold in the United States in the summer of 1946 was 78.3, as compared with 74.9 the previous summer.

They are making *wigs* of nylon "hair" in England, a British trade journal states; these cost little more than wigs of human hair, although greater skill is required to turn out a perfect coiffure.

The talc in face *powders* provides good slip and texture; the zinc stearate or magnesium stearate provide binding; and barium sulfate or zinc oxide form the screen to hide blemishes.

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HOT FROM HEAVEN—Fragment of a shooting star is now in the Grand Canyon National Park's Museum.

ASTRONOMY

Hot Meteor Fragment Buries Itself in Earth

➤ A FRAGMENT of a "shooting star" buried itself in the earth near officials of the Grand Canyon National Park. They were observing the spectacular Giacobini-Zinner meteor shower the night of Oct. 9 when a meteor exploded overhead. A short time thereafter the specimen hit the ground in front of the group with a dull thud. It was still quite hot when dug out from the ground where it had become embedded. This meteorite, two inches long and an inch and a half wide, is a prized exhibit at the park's museum.

Science News Letter, March 22, 1947

PLANT PHYSIOLOGY

DDT Kills Bark Beetle Carriers of Elm Disease

➤ DDT HAS COME to the rescue of American elms, menaced by the misnamed Dutch elm disease from central New England to Chesapeake bay and westward to Ohio. It acts by killing the bark beetles that carry the disease fungus from sick trees to healthy ones.

Healthy trees, say entomologists of the U. S. Department of Agriculture, should be sprayed twice a season: first with a two per cent solution, then seventy-five days later with a one per cent solution. This will kill beetles before they can begin to feed on the twigs and thus inoculate the trees with the disease.

Science News Letter, March 22, 1947

CHEMISTRY

Synthesis of Pyrethrin Insecticide Foreseen

➤ SYNTHESIS of pyrethrin, an insecticide produced from Asiatic and East Indian flowering plants, may be possible in the near future, says Dr. William M. Hoskins, professor of entomology in the University of California College of Agriculture.

Laboratory production of pyrethrin would have important consequences, Dr. Hoskins says. He points out that pyrethrins now cost over $25 per pound, and are still able to compete with other insecticides.

"Suppose synthetic pyrethrin could be made for half that price," he states. "It may even be possible through synthesis to create a pyrethrin that will be active for a much longer period."

While synthetic pyrethrin is not yet ready for use in agriculture, pyrethrin sprays, the potency of which has been increased by the addition of the chief alkaloid of black pepper, piperine, are now being used.

Science News Letter, March 22, 1947

CHEMISTRY

Three Percent of 300,000 Organic Compounds Useful

➤ ONLY three percent of the 300,000 known organic chemicals are currently useful, while the rest await development, Lloyt M. Corley of the chemical research and development department, Armour and Company, estimated recently.

Pointing out that this represents a challenge to chemists, Mr. Corley said that of the 9,000 now useful chemicals, only 5,000 are being manufactured in the United States.

Writing in *Chemical and Engineering News* (Feb. 17), the chemist explained that there are three reasons why so many chemicals have not been developed commercially.

The three reasons:

1. They have not been properly promoted.

2. Civilization has not progressed sufficiently to use them.

3. Production costs are prohibitive in relation to the functions performed.

"Civilization a hundred years from today will require many chemicals that are well known at the present time, but are not now of commercial importance," Mr. Corley predicted.

Science News Letter, March 22, 1947

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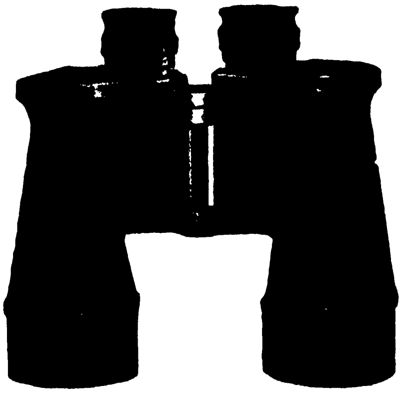

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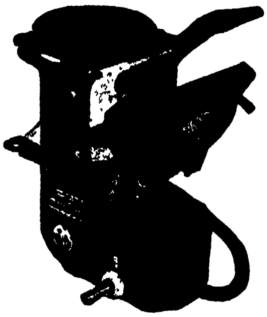

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ORNITHOLOGY

NATURE RAMBLINGS

by Frank Thone

Homeward-Bound Birds

➤ ABOUT this time of year we are apt to become acutely conscious of signs of the new spring. Someone sees a dandelion in bloom in a sheltered spot. Then someone sees a robin. Then suddenly the whole town is full of robins, cheerfully noisy as a veterans' convention.

Actually, of course, other birds get here before the robins do. But they are for the most part less conspicuous, less assertive in their songs, rather more inclined to be shy of man and his works. The gregarious robin, at home on any square yard of sod that has a worm under it, makes the arrival of spring official.

Early songs of robins and other birds are not sweet serenadings of their mates, as is sometimes romantically assumed. The first wave of migrating songbirds, with most species, consists entirely of males, so there just aren't any mates, present or prospective, around to be serenaded.

What happens is that each of the early-arriving males seeks out what looks like a good food-gathering area, perches on a conspicuous limb or stump in it, and proceeds to file claim by singing as loudly as possible. If a rival claimant appears, the first-comer goes after him with a scuffling whir of wings, until he thinks better of it and goes away.

After the hunting-grounds have thus been parcelled out and differences in claims adjusted by many a minor skirmish, the wave of migrating females comes in. Just how much rivalry there is among them for the male that looks as if he might be the best provider is uncertain. It doesn't matter, really; before long every male has his mate and every female her nesting site.

Songs of birds in spring, therefore, are not at all romantic. They are as solidly pragmatic as the arrangements of European immigrants, who would often leave their womenfolk in the Old Country until they had found a job or set up a business, and got hold of the makings of a home.

One piece of romantic nonsense the returning birds should surely drive out of our heads: that notion that "when the swallows homeward fly" they are heading southward. Swallows, and all migrating birds, fly homeward when their course is towards the north. Home is where the nest is.

Science News Letter, March 22, 1947

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AGRICULTURE

Liming Soil Helps Reduce Crop Damage From Fluorine

➤ DAMAGE TO CROPS from fluorine, a farming hazard that has arisen since the large-scale introduction of this poisonous element into certain industries during the war, can be materially reduced by heavily liming the soil, experiments at the New Jersey Agricultural Experiment station show.

In the tests, buckwheat and tomato plants were grown in pots of soil to which various amounts of fluorine had been added. Fluorine damage to plants in soil lots that had also been well limed was much less than it was in unlimed, acid soils. On this basis, the scientists recommend application of lime and superphosphate to soils where industrial pollution with fluorine is a factor.

Science News Letter, March 22, 1947

CHEMISTRY

Solvent Extraction Makes Purer Cottonseed Oil

➤ PURER, lighter-colored cottonseed oil and lighter-colored cottonseed meal that is probably better both for industrial purposes and for feeding livestock and poultry result from a new extraction process developed in New Orleans at the Southern Regional Research Laboratory of the U. S. Department of Agriculture. It should bring about better prices for those two important co-products of the cotton industry.

Oil extraction as now practised involves first heating, then pressing the cottonseed, either in huge hydraulic presses or in more modern continuous-process screw presses. Any kind of pressing process leaves about 6% of the oil in the seed meal, and also releases pigment from certain gland-cells in the seed into both oil and meal, making them darker than necessary.

Researchers at the laboratory discovered that if the seed is finely flaked and then shaken violently in a solvent mixture a three-fold separation takes place: the oil is taken up by the solvent, the oil-free meal settles to the bottom, and the pigment-containing gland-cells float to the top where they may be skimmed off.

As frequently happens in research, this industrially useful discovery was not made as a result of direct effort to improve the quality of cottonseed oil and meal, but is a by-product of scientific curiosity about the cottonseed pigments. In discovering how to get sufficient quantities of the pigments out of the seed for analysis, the chemists hit upon a better way to obtain high-quality oil and meal.

The coloring matter in the seed, they discovered, is not the one pigment which has been known by the name of gossypol, but a complex of at least 11 related pigments.

Science News Letter, March 22, 1947

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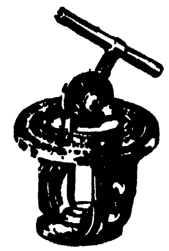

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• Books of the Week •

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ANIMAL HIDE AND SEEK—Dahlov Ipcar—*W. R. Scott,* 40 p., illus., paper, $1.50. Introduction to animal camouflage for the very young (3-7) with familiar animals in simple woodsy settings.

ANYWHERE IN THE WORLD; The Story of Plant and Animal Adaptation—Irma E. Webber—*W. R. Scott,* 64 p., illus., paper, $1.50. Simply told, this account of how animals and plants adjust themselves to climates is brightly illustrated for children 7-11 years old.

BOVINE MASTITIS—Ralph B. Little and Wayne N. Plastridge, eds.—*McGraw-Hill,* 546 p., illus., $7. A symposium by eleven experts covering the diagnosis, bacteriology, pathology, serology, etiology, control, treatment and public health significance of udder infections in dairy herds.

EINSTEIN: HIS LIFE AND TIMES—Philip Frank—*Knopf,* 298 p., $4.50. This fascinating biography of a great physicist endeavors to make his discoveries and formulations as understandable to the layman as is possible; his formula relating energy and mass is basic to the atomic bomb.

ELECTRONIC CONTROL HANDBOOK—Ralph R. Batcher and William Moulic—*Caldwell-Clements,* 344 p, illus., $4.50. A well-indexed reference book on the fundamentals of electronic control principles as used in industry to assist in appraising the value of and specifying these devices.

ELECTRONIC ENGINEERING HANDBOOK—Ralph R. Batcher and William Moulic—*Caldwell-Clements,* 456 p., illus., $4.50 A working tool for engineers interested in electronic applications in the industrial and communications fields, it covers every important circuit and essential application.

HERE IS TELEVISION, Your Window to the World — Thomas Hutchinson — *Hastings House,* 366 p., illus, $4. With emphasis on program and production technique, a thorough account of the industry is presented, including a survey of jobs in this field.

AN INTRODUCTION TO THE GENETICS OF HABROBRACON JUGLANDIS ASHMEAD—Albert Martin Jr.—*Hobson Bk. Press,* 204 p, $3 50. A clear account of the results of investigations thus far made is presented, including a complete list of extant and discarded mutant types of this parasitic wasp.

LAND OF PLENTY—Walter Dorwin Teague—*Harcourt,* 320 p., $3. Describing the new sources of power at our disposal, the new alloys and synthetic materials for our use, the health and educational services at our command, this summary of possibilities for the future re-emphasizes belief in the American system of individual initiative.

LOBUND REPORTS, No. 1—James A. Reyniers, ed.—*Univ. of Notre Dame,* 120 p., paper $1, cloth $1.50. This first of a series of publications to be put out by the Laboratories of Bacteriology, University of Notre Dame, discusses the rearing of germ-free albino rats and germ-free life applied to nutrition studies. The laboratories are engaged in the study of germ-free life.

MALAYA: OUTLINE OF A COLONY—Victor Purcell—*Nelson,* 144 p., illus, $2.50. A spirited account of the country's dramatic past, brief accounts of its economic position in the world, and a balance sheet of British policy and achievement provide a background for a discussion of its future.

MEDICINE IN THE CHANGING ORDER—Report of the New York Academy of Medicine—*Commonwealth Fund,* 240 p., $2. This study of the New York Academy of Medicine's Committee on Medicine and the Changing Order represents a critical examination of every phase of the current medical situation together with thoughtful conclusions as to remedies for present inadequacies.

POINTERS FOR PARENTS—Reinhard V. Lozier—*Lippincott,* 141 p., illus., $2. A commonsense book teaching parents what to do for their children and helping them record growth and development. Because of its brief, to-the-point instructions, it can help solve problems at once.

PRACTICAL PHYSIOLOGICAL CHEMISTRY—Hawk, Oser, and Summerson—*Blakiston,* 12th ed., 1323 p., illus., $10. Completely rewritten, this useful textbook includes new phases of medical biochemistry and an abundance of expository methodological and reference material, recent advances in medicine are presented in the light of clinical applications.

SCIENCE YEARBOOK OF 1947—J. D. Ratcliff, ed., *Doubleday,* 247 p., $2.50. A series of short essays here reprinted summarize scientific events in physics, chemistry, medicine, agriculture, aviation, etc, in 1946.

SOCIAL WORK YEARBOOK OF 1947—Russell H. Kurtz, ed.—*Russell Sage Foundation,* 712 p., $3.50. This description of organized activities in social work and in related fields, alphabetically arranged, covers topics ranging from the administration of social agencies, juvenile behavior problems, labor and social work, to veterans benefits and vocational rehabilitation; each section has a bibliography for further reference.

THE STORY OF WOOL—William F. Leggett—*Chemical Pub.,* 300 p., $5. This historical background for one of the top-ranking industries in the world by providing a deeper understanding of the habits of ancient craftsman should prove an incentive for individual textile artistry.

A SURGEON'S DOMAIN—Bertram M. Bernheim—*Norton*—253 p, $3. An informal frank description of problems and practices, with references to the complexities of hospital administration and the relationship between surgeon-teacher and his students.

TWO BLADES OF GRASS—T. Swann Harding—*Univ. of Oklahoma Press,* 352 p., $3.50. This history of scientific development in the U. S. Department of Agriculture is an absorbing account of the search for better grains, fruits, livestock, and methods of soil and forest conservation, for control of diseases in plants and animals, and for additional economic uses of farm products and by-products.

UNESCO: ITS PURPOSE AND ITS PHILOSOPHY—Julian Huxley—*Public Affairs Press,* 62 p., paper, $1. The background and program of UNESCO interpreted by the Director General of that organization.

YALE UNIVERSITY PUBLICATIONS IN ANTHROPOLOGY, Nos. 35 and 36, Excavations in the Cuenca Region, Ecuador—Wendell C. Bennett—British Guiana Archeology to 1945—Cornelius Osgood—*Yale Univ. Press,* 150 p, illus., paper, $2. Sherds from the excavation in Ecuador are described in detail and a history of the previous work in Guiana is summarized as a background for future investigations.

Science News Letter, March 22, 1947

PHYSICS

Voice Can Be "Watched" While Being Recorded

➤ AN OSCILLOSCOPE figures in the invention offered by Barry Shipman of Pasadena and Robert H. Guhl of Van Nuys, Calif., for patent 2,416,353. It is built into the cabinet of a phonographic recorder, so that the voice of a singer or the tones of an instrument can be "watched" while the record is being made.

Science News Letter, March 22, 1947

Photo Courtesy Ohio State Univ.

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✿ *BABY BASKET, made of a single piece of transparent plastic, keeps the infant in sight at all times. With end handles, it is easily carried, and the high sides of the basket protect the baby from drafts.*

Science News Letter, March 22, 1947

✿ *TWO-EYE viewer of two-inch square photographic slides enables both eyes to be used in examining a single transparency, and gives three-dimensional effect. It somewhat resembles ordinary binoculars without forward lenses, but with a transparent front and a slot for the film.*

Science News Letter, March 22, 1947

✿ *FIRE EXTINGUISHER for early flames, a carbon dioxide apparatus weighing only 12 pounds, has a trigger release opened by grasping two handles like those on pliers. An elongated horn at right angles to the top directs and concentrates the discharged gas on the flame.*

Science News Letter, March 22, 1947

✿ *COLOR-MEASURING instrument, a recording spectrophotometer, is claimed by the makers to be able to distinguish many billions of colors. It separates the elementary colors making up the hue in the object under examination, determining the amount of each. The picture shows one use in matching new teeth with plates already in use.*

Science News Letter, March 22, 1947

✿ *CAN-OPENER, wall-type, with a hinge by which it can be folded back out of the way when not in use, makes a clean shearing cut by means of a plain roller without sharp cutters or cutting wheels. This chromium-plated steel tool opens cans of any size by shearing the lid directly under the bead.*

Science News Letter, March 22, 1947

✿ *ADHESIVE, for bonding wood in forming laminated beams and other structures, is especially useful where electronic heating methods are available. It does not spark when electrodes come in contact with the squeeze-out of glue or with the glue line itself. It makes radio-frequency bonding methods more practical.*

Science News Letter, March 22, 1947

✿ *DUST COLLECTOR, portable-type, has a baffle plate beneath its filter tubes that causes heavy dust to be deposited at the point of intake, before the air enters its tubular filters. In this it differs from most dust collectors of the tubular filter type which rely solely on the filters to remove the dust.*

Science News Letter, March 22, 1947

Question Box

AERONAUTICS

What is the purpose of the fog clearing system tested in Akron? p. 182.

AGRICULTURE

How can fluorine damage to soil be reduced? p. 190.

CHEMISTRY

How is aluminum obtained from clay? p. 179.

Why have so many chemicals not been developed commercially? p. 188.

DENTISTRY

What treatment is recommended for preventing tooth decay? p. 180.

GEOLOGY

How old was the earth recently estimated to be? p. 179.

ICTHYOLOGY

How does lampblack save fish from drowning? p. 182.

MEDICINE

What is the attitude of Soviet scientists toward mental health? p. 181.

What is the good news for leukemia sufferers, p. 185.

What is the newest hope for arthritics? p. 183.

ORNITHOLOGY

Are early spring songs of birds romantic serenadings of their mates? p. 190.

Where are the smallest owls on earth found? p. 184.

RADIO

From what scientific achievement did the midget radio come? p. 187.

SURGERY

On what does the success of transplanting organs depend? p. 179.

TEXTILES

To what is the strength of non-woven fabrics due? p. 178.

VETERINARY MEDICINE

How do vampire bats harm livestock? p. 178.

Where published sources are used they are cited.

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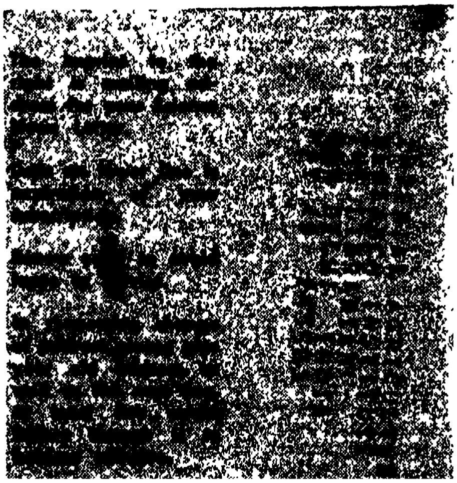

PHYSICS

Atomic Age Bright Lights

Fissionable materials will be scarce for domestic use such as in ceramics or photography, but will continue to be available for electric light bulbs.

➤ SOME OF the atomic bomb's fissionable ingredients which you have around the house may become rarities, but your light bulbs will shine just as brightly.

These are some of the facts of life in an atomic age. Yellowish-green, fluorescent glass, getting its unique qualities from uranium, cannot be manufactured in the United States after April 1, under regulations laid down by the U. S. Atomic Energy Commission.

Pottery plates, cups and vases with a certain striking red color and a sort of yellowish tinge are out, too. The color came from uranium, and some of these pieces, which were very common before the war, may become collector's items.

Light bulbs, however, will continue to use thorium, which scientists have found can be used with uranium in an atomic bomb. The well-known tungsten filament of light bulbs contains one to one and one-half percent thorium to increase the light.

Rules issued by the Atomic Energy Commission prohibit use of uranium in ceramic or glass products and in photographic work, unless under "exceptional circumstances," after April 1. Ceramic and glass products with uranium are already scarce because the use of uranium was curtailed during the war.

In photography, uranium is used in toning baths, but other satisfactory chemicals are available and more frequently used. Uranium compounds for photographic use have not been sold for several years due to wartime restrictions.

Under the commission's regulations, which become effective April 1, licenses will be required for all materials with one-twentieth of one percent of uranium and thorium or any combination of the two elements.

Glass, ceramics and photography are listed as exceptions to this rule, but another provision says there will be no further supply for use in those products.

Incandescent mantles, refractories, certain rare-earth metals and compounds and vacuum tubes are exempt from licenses as is any transfer or delivery during one calendar month of uranium or thorium ores which contain less than 10 pounds of the metals.

In addition to light bulbs and many specialized tubes which use thorium, crucibles using thorium oxide, employed in melting such elements as platinum, and compounds of rare-earth elements which naturally contain some uranium or thorium will be permitted without any license.

Science News Letter, March 29, 1947

MEDICINE

Hydrogen Peroxide vs. TB

➤ HYDROGEN PEROXIDE, the household first aid treatment for cuts a generation ago, may help the fight against tuberculosis.

Tuberculous abscesses which had not been helped by any other form of treatment cleared up when this remedy was applied in wet dressings two to six times daily, Dr. Ethan Allan Brown of Tufts Medical School and Dr. L. W. Slanetz of the University of New Hampshire report in *Science* (March 21).

The treatment was given over a period of four to eleven months. To make sure the improvement was not temporary, the doctors delayed reporting the results until a year after the abscesses had healed.

The peroxide used was a special form made by dissolving urea peroxide in anhydrous glycerol, which gives a more stable solution. Successful use of this new type of antiseptic solution in middle ear infections, mouth infections and empyema was reported by Dr. Brown a year ago.

When laboratory tests showed it could kill tuberculosis germs, Dr. Brown decided to test its possibilities as a remedy in human patients. These trials were made with Dr. Joseph Goldberg on four patients at the Essex County Tuberculosis Sanatorium at Danvers, Mass.

The patients had the extremely chronic, smoldering type of abscesses known as "cold abscesses" which are both troublesome and very likely to relapse. While four patients is a small number, the doctors are reporting these preliminary trials of the peroxide solution in the hope that other doctors will be stimulated to explore further its possibilities.

Science News Letter, March 29, 1947

AERONAUTICS

Flying-Wing Bomber Nears Completion

See Front Cover

➤ A FLYING-WING jet-propelled Army bomber is nearing completion at the Northrop plant, it has been revealed. It is the first of the type ever built.

This new plane, shown in the Army Air Forces photograph on the cover of this SCIENCE NEWS LETTER, which is all wings and has neither tail nor the familiar fish-shaped body, is a brother to the giant Flying Wing bomber and cargo ship which made its first flight test during 1946. Unlike it, however, it has no visible propellers to push it through the air.

This new jet-bomber, the YB-49, is powered by eight General Electric J-35 jet engines, capable of producing a total of 32,000 pounds thrust. They are arranged in two groups of four, one group on each side of the center. Like its older brother, the B-35, it is controlled by Northrop-designed elevons, a control surface that performs the functions of both elevators and ailerons in ordinary planes.

The new Flying Wing is 53 feet long and has a spread of 172 feet. The B-35 Flying Wing has the same span. Both are the nearest approaches yet made to airplanes consisting wholly of supporting surfaces. Almost every portion of both contribute to lift, and the parts of ordinary planes that contribute most to drag are lacking.

America is not the only country experimenting with jet-propelled flying-wings. The British have announced a twin-engine, jet-propelled, tailless plane that is now ready for tests in the air. It is considerably smaller than the YB-49, but plans for larger versions are already made. (See *SNL*, Jan. 25, 1947.)

Science News Letter, March 29, 1947

Colored flames in a fireplace may be obtained by mixing with the fuel lithium chloride for purple, strontium nitrate for red, copper sulfate for blue, and sodium chloride (common salt) for orange flames.

16 MAY 1947

NUTRITION

Starvation Breeds Unrest

Underfed people of Europe are in danger of civil unrest. Hungry children cannot learn to be good world citizens on empty stomachs.

➤ A POPULATION getting less than 1,900 calories per person is in danger of civil unrest, Dr. Arnold P. Meiklejohn, senior consultant in nutrition in the UNRRA European Regional Office, declared at a conference in Washington.

He cited 16 hunger strikes and some hunger marches that occurred in Austria last spring before UNRRA supplies began to flow into that country. Observations of underfed people in Europe and of conscientious objectors who were the guinea pigs for famine studies at the University of Minnesota both show that people on short rations are affected mentally as well as physically. Irritability, apathy and sensitivity to noise are among the effects noted.

Underfed children fail to grow normally. Even worse, from the standpoint of future world understanding and peace, they fail to learn. Many children in Europe today are going to school without breakfast, Dr. Meiklejohn reported. "It is hard to learn on an empty belly," he commented.

Relief shipments of grain should be wheat, not corn, unless dried milk or some kind of milk product can also be made available. This, he explained, is because of the danger of pellagra developing among people living on a corn diet. Milk supplies the pellagra-preventing vitamin and so does wheat if the wheat is not milled in a way to remove the vitamin.

Except for rickets in children, for which cod liver oil is needed, there has been little or no vitamin deficiency disease in Europe. Major epidemics have not occurred, but the tuberculosis death rate is twice what it was before the war.

Infant mortality is also well above prewar levels. In some regions of Poland and Yugoslavia, one out of every three children born died during the first year of life. Overcrowding, lack of sanitation, and fatigue and underfeeding of the mothers is responsible.

The reason postwar health conditions have been no worse, Dr. Meiklejohn said, is that enormous quantities of UNRRA food went into Europe. This food averted major famines in Greece, Yugoslavia and Austria.

Science News Letter, March 29, 1947

PHOTOGRAPHY

Matchbox Camera For OSS

➤ TINY CAMERAS, small enough to hold in the palm of a person's hand or to be disguised as match boxes, were used by the OSS and underground forces during World War II.

The story of the matchbox camera, and the vestpocket darkroom which was used with it, have been revealed by the Eastman Kodak Company, which made 1,000 of the cameras in a secret, wartime project.

Pictures about one-half inch square were snapped with the tiny cameras for intelligence use and to supply pictures for various "resistance" newspapers. Film was developed in a small glass holding a jigger of solution. Complete equipment for processing the films was contained in a pocket-size darkroom outfit which had rolls of 16 mm. film, photo chemicals in pill form and other items needed for developing the small film.

Designated "M. B.", the camera could hold two-foot coils or spools of film with about 30 exposures each. The lens was f.5 with one stop to shut the aperture to f.11, and the shutter speed was about one-fiftieth of a second.

With the subject in focus from about eight feet to infinity, the camera permitted "shooting from the hip" and had no view finder. It was operated by pushing a small plunger, which produced a slight click. Time exposures could be made using a wire lever.

Focal length of the lens was one inch and the angle of view approximately 45 degrees. A small stand and close-up lens permitted the camera to be used for copying photographs or printed matter.

The midget camera had a molded bakelite inner case sheathed in a dull black metal outer case. Plans for the camera began in 1943 and 500 were delivered in 1944, followed by an additional order of 500.

Science News Letter, March 29, 1947

MATCHBOX CAMERA—This tiny camera could be concealed and used easily. Eastman Kodak Company built 1,000 of these for use by OSS agents and underground forces.

MEDICINE

New Method Detects Pollen That Starts Asthma Attacks

➤ A NEW WAY of detecting the particular pollen that brings on an asthma attack in a sensitive person has been developed by Drs. Francis C. Lowell and Irving W. Schiller of Massachusetts Memorial Hospitals and Boston University School of Medicine.

Instead of injecting or scratching the pollen solution into the skin, these doctors have their patients inhale an aerosol, or very fine mist, of the suspected pollen. Before and after measurements are made of the patient's vital capacity, that is, the number of cubic inches of air he can forcibly expel from his lungs after taking a deep breath.

The vital capacity was reduced to as much as 60% of its pre-test value when the patient inhaled an aerosol containing an extract of the pollen that caused his asthmatic attacks. The reduction occurred usually within six to ten minutes and the vital capacity returned to the pre-test value within 50 minutes.

Science News Letter, March 29, 1947

MEDICINE

Cocktails Help Heart

Alcohol relaxes nerves and dilates blood vessels, letting blood reach heart and helping people with heart disease and high blood pressure.

➤ COCKTAILS ARE GOOD for people with heart disease, doctors at a conference in Cleveland of the new American Foundation for High Blood Pressure agreed.

The reasons are that the alcohol relaxes the nerves, reduces tension and dilates the small blood vessels. Constriction of the blood vessels raises the blood pressure, and this in turn can damage the heart. In coronary disease and angina pectoris the heart is in trouble because it does not get enough blood from its constricted or blocked arteries. Dilating them with a cocktail helps.

The popular warning, "Watch your blood pressure," said to a friend who is about to get angry, carries an important medical lesson. Anger, as is well known, temporarily raises the blood pressure.

Less well known is the effect on the blood pressure of unconscious rages. When these are aggravated by a situation that causes conscious anger, the blood pressure may be raised and not go down when the conscious anger is relieved by a temper outburst.

Fair, fat and fortyish women may hold in their bodies, another clue to high blood pressure and artery hardening. This relates to the body's handling of a fat-like chemical, cholesterol. The chemical is found in increased amounts in the walls of hardened arteries. Feeding the chemical to chickens speeds the process by which cholesterol is deposited in the artery walls to thicken them and spoil their elasticity.

In gall bladder disease, which often afflicts the woman who is fair, fat and forty, the body does not utilize fats properly and fails to get rid of excess cholesterol.

Doctors are not yet ready to advise any special anti-high blood pressure diet on the basis of these clues, but they believe the clues should be followed by further research.

Heredity may be the number one factor to investigate in the search for methods of curing or preventing high blood pressure. Why repressed rage leads to high blood pressure in one person and not in another may be a matter of hereditary constitution.

A trace of some chemical taken in food or drink every day may play a role. If two parts per million of fluorine in drinking water can mean the difference between good and bad teeth, the same trace amount of some chemical may mean the difference between arteries that remain soft and elastic and those that harden.

Science News Letter, March 29, 1947

VETERINARY MEDICINE

Livestock Disease Blitz

➤ A JOINT U. S.-Mexican "blitz" against foot-and-mouth disease below the Rio Grande is poised, ready to go into action now that the appropriation of the necessary $9,000,000 war fund has been put through Congress. Mexico has already pledged nine millions and a good bit over—and that is a good deal more for Mexico to spend than it is for us, on a ratio-to-national-income basis.

Wiping out the infection means wiping out not only animals known to be infected but also all healthy but unexposed animals in the neighborhood. The technique is rapid, drastic and ruthless.

First a deep trench is dug. This can be done quickly nowadays, thanks to the development in recent years of heavy earth-moving machinery. The condemned cattle are driven into it and killed by shooting. Then rubber-booted, rubber-clad men slash open the carcasses, to insure rapid and complete decomposition after burial. Quicklime is thrown into the trench, and earth filled in to a depth of at least five feet. Boots, rubber garments, barns, implements—everything that might possibly carry a trace of the virus—get a thorough scrubbing with strong lye water.

The quicklime may not be necessary, but it is used just to make sure. Deep burial really does the trick; the virus does not long survive contact with the soil and the aggression of the swarming soil micro-life.

A most important thing is not to leave any carcass where stray coyotes or other carrion-seeking animals can get at it. That is why deep burial is so much emphasized. Five feet of earth on top of a dead animal is more than any coyote, however hungry, will dig through to get a meal.

Science News Letter, March 29, 1947

Potency of *penicillin* is now measured by a quick photographic method developed at the University of California.

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AERONAUTICS

Racon Routes in Alaska

Radar beacon airways operated from seven stations will open the Great Circle route in bad weather from America to the Far East.

➤ RADAR BEACON airways in Alaska and the Aleutians, which the U. S. Army revealed recently will be established in the near future, will open up for use in bad weather the Great Circle, or short route, from America to the Far East.

Seven such stations are to be erected. The equipment to be used is the war-developed radar navigational beacon, known as "racon" for short, by means of which planes in the air determine their position by radar signals from ground stations.

The stations will be erected at widely distributed points, extending from southern Alaskan airports to Point Barrow on the Arctic and Nome on the Bering. One will be established on Adak in the Aleutians. This distribution will help exploratory flying in Polar regions, and also local traveling in Alaska itself. This is important; much of Alaska today depends upon dog-sleds and aircraft for transportation.

War-developed racon was first used experimentally late in 1942, but later played an important part in all theaters of combat. Developments have continued since the war and radar beacons are now used on the North Atlantic air route to Europe. This Alaskan installation is the first effort to provide radar coverage over established continental air routes, and will provide training to pilots for other radar airways to be established in continental United States.

Racon is an electronic beacon placed ashore at selected ground positions to serve both surface and air ships. When radar signals from transmitters aboard ships are received by the beacon, its transmitter is triggered and gives out automatically an answering signal in code. The code is its station identification. A navigator is able to fix his position in relation to the beacon by means of a simultaneous plot of both range and bearing of the beacon from the ship on the scope of his radar.

Racon airways can be used only by aircraft equipped with airborne radar units. The beacon signal can be received clearly up to 150 miles. The ideal distance planned for the forthcoming radar airways will be about 100 miles between installations of beacons. Racon can be used as a low approach aid and the radar beacon provides the pilot with exact headings to fly any distance from the touch-down point.

Science News Letter, March 29, 1947

PHYSICS

Fluxmeter Guarded U. S. Harbors From Enemy Craft

➤ A DEVICE known as the fluxmeter, which was connected to underwater cables, has been revealed as the guardian of U. S. harbors from enemy craft during the war.

The fluxmeter measures changes in a magnetic field, and in World War II it warned of ships or even small motorboats crossing the cables at the entrance of a harbor.

Iron and other materials in the craft passing over the cables changed the earth's magnetic field enough to be detected by the fluxmeter. The small voltages from the cable as metal objects passed through the harbor entrance were registered on the fluxmeter.

Thus, even small enemy craft, hidden from sight and with silenced motors, could be detected from shore stations. When unidentified ships or boats were detected, harbor forts were alerted and PT boats sent to investigate.

Science News Letter, March 29, 1947

PHYSICS

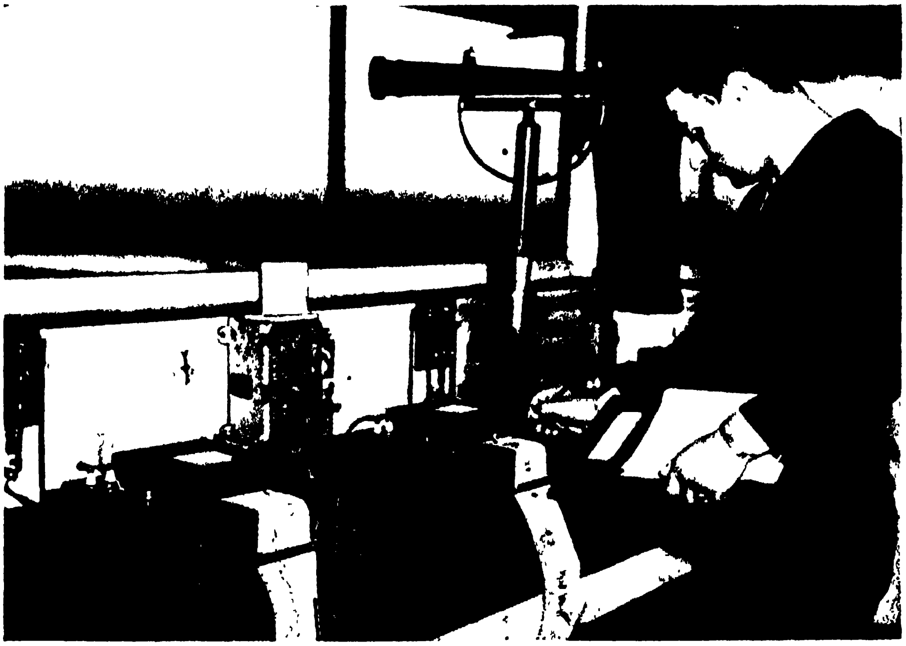
Lighting System Lessens Anger Among Night Drivers

➤ HAVE YOU EVER been heated up to the cussing-point, while driving at night with your lights dimmed, by having an approaching motorist flicker his lights at you? Darn fool didn't know the dimmer was on already!

To mitigate this cause of ill feeling among night drivers, a Washington inventor, Thomas M. Johnston, has devised a lighting system that adds a third lamp, directly in front of the radiator. This lamp is "off" when the main headlights are bright, "on" when they are dimmed. Thus if you see a car coming at you with three lamps all in a row, you will know that the dimmer is on, and there's no cause to flicker your lights at him.

The device is covered by newly-issued U. S. patent 2,417,501.

Science News Letter, March 29, 1947



HARBOR "WATCHDOG"—The fluxmeter, developed by General Electric, detected all vessels in critical waters during the war and gave a warning.

ENGINEERING

Synthetic Liquid Fuels

Petroleum reserves are limited, but the answer to independence from relying on other nations for fuels lies in synthetics. Bureau of Mines research is progressing.

By DR. R. R. SAYERS

Director of the U. S. Bureau of Mines

Radio talk given on "Adventures in Science" over the Columbia Broadcasting System.

➤ THE ENORMOUS drain of the war upon this country's supply of petroleum has brought us face to face with the realization that our remaining reserves are limited. And the demand is increasing steadily to provide power for automobiles, planes, ships, locomotives, industrial plants, and household heating units. Peacetime oil requirements are greater than those of the peak war year. We no longer have a reserve capacity for emergency use.

Our government has an answer—synthetic liquid fuels, the fuels of the future.

Oil Scarcity

We now seem to be passing from an era of abundant oil to an era of oil scarcity, so far as crude oil supplies in this country are concerned. We can not produce more from known fields without irretrievable loss. Oil is now being withdrawn from the wells at or near the maximum efficient rate. The cost of finding oil has risen sharply, and unprecedented volume of exploratory drilling has failed to locate the additional new reserves needed.

We are importing oil. But we should not place too great dependence on foreign sources of petroleum. We must develop auxiliary domestic fuel sources, to use in emergencies and, incidentally, to hold down the price that we must pay for foreign oil. This means we must develop synthetic liquid fuels—oil and gasoline obtained from coal, oil shale, and other materials.

In 1944, Congress directed the Bureau of Mines to design, build, and operate synthetic liquid fuel demonstration plants. Those will serve as models for private enterprise in a coming new industry which may well attain mammoth proportions.

Our coal and oil shale can make us wholly independent of foreign sources for many generations to come. But this will be true only after practical conversion of coal and shale has been achieved and large plant capacity provided. The Bureau's synthetic fuels program is the foundation for the establishment of this vitally important industry.

German Production

Germany was the leading European producer of synthetic fuels. Lacking enough petroleum, the Germans fueled their army and air force almost exclusively with oil and gasoline extracted from coal. But technicians from industry and the Bureau of Mines, following closely in the wake of our invasion troops, collected all of her plant and laboratory secrets and since then have added refinements of their own.

There are five major processes and sources of synthetic fuels, any or all of which may come into use in this country as petroleum supplies decline to the point where the higher-cost synthetics become commercially competitive with natural petroleum products.

Five Processes

Alcohols can be made from the fermentation of vegetable matter.

Natural gas is converted to liquid fuel by the gas synthesis process. Then there is distillation of oil shale.

The liquefaction of coal or lignite by the high-pressure hydrogenation process. Then there is conversion of water gas from coal or lignite by the gas-synthesis process.

All of these potential sources of liquid fuels are under study in the United States. The Department of Agriculture is investigating costs and manufacturing steps for the production of alcohol and other liquid fuels from agricultural residues, such as corn cobs. Private industry has announced plans for the construction of two commercial plants to convert natural gas to gasoline. Oil shale distillation and coal liquefaction are being studied by the Bureau of Mines.

At Pittsburgh, Bureau of Mines scientists have improved both the direct hydrogenation and indirect gas synthesis methods of converting coal to oil. In the hydrogenation process, lower pressures and lighter equipment are among the keys to production economy. Bureau of Mines men have found a way to convert coal to a distillable oil at relatively low pressures by employing special solvents and very active catalysts. Another radical departure from European practice is the discovery that coal may be hydrogenated in a dry or powder state. This simplifies the process by eliminating several costly and complicated steps, together with the equipment required for them.

Gas synthesis produces a superior grade of Diesel oil -a factor which interests our navy. We are investigating both processes, and our engineers today could build an improved hydrogenation plant with an over-all heat efficiency of 56% compared to a 29% maximum efficiency attained in the typical German plant.

Synthetic Liquids

The Bureau of Mines is burning an underground Alabama coal seam to determine how practical it is to produce a useful combustible gas without the expense of mining coal, a part of its synthetic fuels research. If as successful as is hoped, it may produce an almost inexhaustible source of synthetic liquid fuels and cheap electric power. Preliminary results are encouraging in the Bureau of Mines experiment, conducted with the aid of the Alabama Power Company. Although the gas produced thus far is not as rich as Bureau scientists believe possible, it still offers promise of many potential uses. It not only can be used for manufacturing synthetic gasoline and oil, but offers a new and novel source of heat and fuel for either steam or gas turbines and the generation of electric power.

If tests demonstrate that underground gasification is practicable, this country could tap innumerable coal deposits not now worth the expense of mining. This might even supplant conventional mining in part. It would result in a more complete recovery, for coal mines usually leave as much as 35 percent of their reserves in the ground.

Significant discoveries in getting fuel from oil shale have been made. Bureau of Mines chemists at the oil shale research and development laboratory in Laramie, Wyo., have developed a thermal solution process which employs hot solvents to extract oil from the shale. With it, they have obtained more oil out of the shale than the assay estimated was in the shale. The Bureau's oil shale demonstration plant near Rifle, Colo., will be put in operation during the next two or three months. Coal, however, is this country's real future source of fuel. Excluding atomic energy materials, coal comprises 98.8% of our mineral-fuel energy reserves, whereas oil shale amounts to only 0.8%, petroleum to 0.2%, and natural gas to 0.2%.

Bureau of Mines research findings and patents will be made available to all industry, large and small, and to any interested citizen. A technical advisory committee composed of some of industry's leading coal and petroleum experts has been named to assist the Bureau and is kept abreast of all plans and developments.

We are not waiting until a crisis and the Nation's economy and security are in jeopardy. When we are spending more than 10 billion dollars a year to maintain an army and navy, it does not appear unreasonable to spend at least one two-thousandth of that sum —or $5,000,000—to make sure that the planes, tanks, and ships will be able to **move.**

Science News Letter, March 29, 1947

PSYCHOLOGY

Problems from Brain Maps

Frustration or too much motivation may narrow brain maps, formed in learning, causing psychological difficulties of men and nations.

➤ INADEQUATE "brain maps," narrowed in the learning process by too intense motivation or too much frustration, may be the key to the psychological difficulties of men and nations, Dr. Edward C. Tolman, University of California psychologist and expert on animal behavior, declared in the annual Faculty Research Lecture in Berkeley.

Both rats and men, Dr. Tolman said, form in their brains what he calls "cognitive maps" of the environment during learning. On a simplified scale, for example, a rat running through a maze to a goal such as food or water forms in its brain a "cognitive map" of the maze environment.

If the rat is permitted to roam the maze when well fed and with plenty to drink, it appears to learn nothing. But if later placed in the maze when hungry, the rat readily proves it has learned by going to the goal. Under these optimum conditions the rat has been able to form a broad cognitive map of the environment.

If, on the other hand, the rat learns the maze when hungry and thirsty, its cognitive map is narrowed by intense motivation. The correct route to the goal is fixated in the brain and if this is blocked, the strain of intense motivation and frustration makes it difficult for the rat to learn a new route.

This mechanism of too strong motivation and too much frustration is seen at the human as well as the animal level, Dr. Tolman declared. The "cognitive maps" of children may be narrowed by an overintense striving for material wealth. When this is not forthcoming, the individual takes out his frustration on "out-groups."

"Over and over again," he said, "men are blinded by too intense motivations into blind and unintelligent and, in the end, desperately dangerous hates of outsiders. The expression of these displaced hates ranges from discrimination against minorities to world conflagrations."

"We dare not let ourselves or others become so over-emotional, so hungry, so ill-clad, so over-motivated that only narrow strip maps are developed. We must subject our children and ourselves to the optimal conditions of moderate motivation and to the absence of unnecessary frustration whenever we put them and ourselves before the great God-given maze which is our human world."

Science News Letter, March 29, 1947

In territory formerly German but now Polish, there is an estimated reserve of nearly 15,000,000,000 tons of brown *coal;* this coal can not be stored over ground for periods of time because it has up to 50% water content.

ENGINEERING

Metals for Jet Engines Tested in Special Dugout

➤ SPINNING, RED-HOT metal disks in a special dugout at the Westinghouse Research Laboratories in Pittsburgh are going to help develop parts for future jet engines.

Heated to temperatures above 1,400 degrees Fahrenheit, the disks will spin at speeds of 1,200 miles per hour until they fly apart. The disks, made of specially developed alloys, will reveal the maximum strength of the materials to help engineers plan new alloys for engines.

The "metal torture" tests will be made in a dugout sunk 10 feet below floor level and lined with sandbags.

Metals to be tested are used in the rotors of present gas-turbine engines where they stand up under terrific stress and temperature. In the tests, actual operating conditions will be exceeded to find out how much heat and stress is needed to break up the metal.

From the tests in the dugout, Westinghouse engineers hope to devise principles from which they can predict the behavior of metals at any speed or temperature.

The disks, which will whirl at 35,000 revolutions per second, are one foot in diameter and one inch thick.

Science News Letter, March 29, 1947

SANDBAG DUGOUT—To measure the strength of jet engine alloys, Westinghouse scientists use a high-speed motor to whirl the metal disks being tested.

CHEMISTRY

New Yeast Fermentation Yields More Glycerin

➤ GLYCERIN, needed in huge quantities for a thousand industrial purposes, is in short supply because of the scarcity and high price of fats used in soap making, of which it has long been a co-product. Its production directly from sugars by yeasts or other microorganisms, though possible, has been attended with some difficulties. Newest effort to overcome these is embodied in U. S. patent 2,416,745, issued to a team of three microbiologists, Prof. Ellis I. Fulmer and Dr. L. A. Underkofler of Iowa State College at Ames, and Dr. Richard J. Hickey of Terre Haute, Ind.

Ordinary yeast fermentation produces a little glycerin along with the ethyl alcohol. Addition of a soluble sulfite to the sugar solution upsets the fermentation chemistry in such a way that larger quantities of glycerin are produced. Carried on in an alkaline medium in the past, this production has still not been satisfactorily large because yeasts do not thrive on alkaline conditions. In the new process, the medium is acidified, making it possible for the yeast to work more efficiently.

Rights in the patent are assigned to the Iowa State College Research Foundation.

Science News Letter, March 29, 1947

ZOOLOGY

"Timid" Deer Prove Courageous in Defense

➤ DEER, proverbially timid and helpless, are capable of courageous fighting in defense of one of their own, even when the battle is hopeless. First-hand account of such a fight is presented by Victor C. Cahalane, U. S. National Park Service naturalist, in the *Journal of Mammalogy* (Feb.).

In Grand Canyon National Park, one autumn afternoon, he saw three coyotes pull down a deer. They were so preoccupied with their efforts to kill their victim that he was able to get within about 60 yards of the struggling group without being observed.

He had been watching the woodland tragedy for only a few minutes when a band of seven deer, six of them does, appeared on the scene. They approached slowly, until the coyotes, sensing their presence, formed a defensive front against them.

"The precaution was well advised," states Mr. Cahalane. "The largest doe took the offensive several times. Lunging into the midst of the coyotes, she struck vigorously with her front hoofs together. With ears laid back and eyes protruding, she was transformed into a veritable Fury. Each time that she singled out a coyote and charged, that animal beat a hasty retreat, sometimes backing off eight or ten yards."

It was in vain, however. The stricken deer had been hurt beyond any chance of recovery, and the bold female champion, with one younger backer who finally joined her, was in danger of being attacked on the flank. So the attempted rescue had to be abandoned.

Once successful in killing their victim, the three coyotes proved less cooperative than the deer had been in threatening them. They quarreled over the booty, with one lame-footed female bullying her two smaller companions and taking first rights to the prey.

Science News Letter, March 29, 1947

ENGINEERING

Gas Expansion Turbines Used in Oil, Gas Fields

➤ NATURAL gas expansion turbine engines are rapidly replacing reciprocating engines in gas and oil fields, the American Society of Mechanical Engineers in Tulsa, Okla., was told by Stephen Bencze of the Elliott Company, Jeannette, Pa., well-known as a manufacturer of gas turbines.

This gas expansion turbine is not the relatively new gas turbine engine. The gas-expansion type is driven by gas in the same way that steam drives steam turbines. The gas used to drive the turbine is not burned in the process. It is merely expanded by heat. After discharge from the engine it can be used for any of the purposes for which it was originally suitable.

Gas turbine engines, on the other hand, are powered by gases created by combustion from liquid or gaseous fuels. A new type will burn a very finely pulverized bituminous coal. The exhaust gases have no subsequent value.

The increasing use of the natural gas expansion turbine engine in oil and gas fields, to drive pumps, generators, fans and other equipment, is due to its economy and efficiency. Some of them are so constructed that they can be converted quickly into steam turbines if the gas supply is temporarily exhausted.

Science News Letter, March 29, 1947

IN SCIEN

HORTICULTURE

Fatal Orange Disease Is Found in Australia

➤ TRISTEZA, a virus disease highly fatal to sweet-orange trees grafted on sour-orange stocks, has been found in Australian citrus orchards, according to information received at the U. S. Department of Agriculture. It is apparently South African in origin, and got a foothold in the Netherlands Indies and South America. It received its name from the terrible destruction it wrought in Brazil: "tristeza" means "sadness" in both Portuguese and Spanish.

A disease having exactly the same symptoms but spreading much more slowly from tree to tree has been known for some time in California, under the name "quick decline." (See *SNL*, Feb. 22.)

Australian citrus men apparently consider the two diseases to be identical. The slower spread in California orchards may be due to the much more thorough spraying and disinfection schedule practised in them, which would presumably decimate and slow down the still-unknown insect carrier of the virus.

Science News Letter, March 29, 1947

PLANT PHYSIOLOGY

2,4-D Takes Plant Life By Internal Suffocation

➤ 2,4-D KILLS plants by robbing them of the ability to utilize oxygen in their life processes; in effect, it acts by a kind of internal smothering. Experiments pointing to this conclusion are reported in *Science* (March 14), by two Chinese plant physiologists, Dr. Y. L. Hsueh and Dr. C. H. Lou, of Tsing Hua University, Kunming, China.

Like many other compounds, 2,4-D was found to be a stimulant at low concentrations and a poison at higher ones. In its growth-stopping concentrations, it wholly prevented the germination of seeds that normally require oxygen for their sprouting. But the same concentrations only delayed, and did not prevent, the germination of rice, which normally sprouts under water without aid from the oxygen of the air.

Science News Letter, March 29, 1947

E FIELDS

ICHTHYOLOGY

It's a Girl Always For "Amazon Molly"

➤ "AMAZON MOLLY" never has any sons, only daughters. Not only that, but no matter who their father is, the youngsters never look the least bit like him, resembling only their mother.

"Amazon Molly" is a guppy-like fish native to Texas and northern Mexico. To scientists she is *Mollienesia formosa.* No male fish of the species has ever been found.

Dr. and Mrs. Carl L. Hubbs of the Scripps Institution of Oceanography in La Jolla, Calif., have during the past dozen years mated "Mollies" with males of 56 related species, breeding something like eight thousand young fish representing 20 generations.

No luck. All daughters. And not one looked like her Pa.

Science News Letter, March 29, 1947

BIOCHEMISTRY

New Biochemical Test Tells Exact Week of Pregnancy

➤ A NEW BIOCHEMICAL test for pregnancy, that tells with fair accuracy how many weeks have elapsed since conception, has been developed at the University of California Medical School by Dr. Ernest W. Page, who reports his results in *Science* (March 14).

The test is based on the presence in the blood of pitocin, one of the secretions of the pituitary gland. Something in the blood of pregnant women destroys this substance; and the farther pregnancy has advanced the more rapid is the rate of destruction. Dr. Page postulates the existence of a still-unisolated pitocin-destroying enzyme, which he has named pitocinase.

The test consists in adding to a blood serum sample from the prospective mother a small measured quantity of commercial pitocin and keeping it warm in an incubator. At intervals, fractions of the serum are withdrawn, chemically treated, and applied to reproductive tissue from a laboratory animal to test a biological reaction. The process is complicated, but in the hands of a sufficiently well-trained technician can tell the week of pregnancy, between the fourth and the sixteenth. Before the fourth, Dr. Page states, "there is no known pregnancy test which may be considered accurate." After the sixteenth week, methods already in use are more rapid and satisfactory.

As a simple "yes-or-no" test, Dr. Page makes no special claim for his method. He says, "Despite its economy, this method, when used as a purely qualitative indication of pregnancy, requires more time and skill in its present form than a Friedman or Aschem-Zondek test."

Science News Letter, March 29, 1947

MEDICINE

Emotional Epilepsy Is Frequent Sickness

➤ A LITTLE KNOWN type of epilepsy, often confused with petit mal and which is sometimes accompanied by acts of a violent nature, is much more prevalent than has been supposed.

Dr. Charles D. Aring, professor of neurology in the University of California Medical School, describes the condition, called psychomotor epilepsy, in *California Medicine* (Feb.).

He said that when recognized the disease is easily treated by the proper administration of either or both of the two anticonvulsant drugs, dilantin and phenobarbital.

Dr. Aring said that in this type of seizure an emotional disorder is a frequent manifestation. He said that it can be distinguished from petit mal epilepsy if physicians remember that the latter rarely occurs in adults and that it is usually of brief duration (five to thirty seconds), usually without movements or activities, except in or about the eyes.

He added that diagnosis is aided by electroencephalography, the study of electrical activity of the brain. A period of amnesia, whether long or short in duration, may in some cases be associated with this type of epilepsy.

"Any person experiencing rather short episodes of unusual behavior for which he has no memory might well be suspected of suffering from attacks of psychomotor seizures," Dr. Aring stated.

The physician pointed out that the condition raises the question of legal responsibility for acts, sometimes of a violent nature, which may be committed during the attack of psychomotor epilepsy. This seems to have been largely overlooked in the courts, he said.

Science News Letter, March 29, 1947

MATHEMATICS

Electronic Device Computes Engine Temperatures

➤ MECHANICAL ENGINEERS at the University of Wisconsin have invented an electronic computer which can "solve" the complex mathematical formulas by which engineers learn the temperature of exploding gases in engine cylinders.

The device makes the work now being done with diesel engines many times more accurate, quick and efficient. It has been developed as a scientific accessory to the electro-optical pyrometer which gauges the temperature of exploding gases within the cylinder of an expermental diesel engine. Work with the pyrometer may in the future result in the designing of new and better diesel engines.

Engineers formerly spent hours solving the equations which told the temperature of the diesel explosions, first taking a reading from two oscillographs, consulting a graph, and then plotting the mathematical result on paper and determining an "average curve."

The new device now plots on an oscillograph the temperature of an explosion or series of explosions. The oscillograph is photographed every few seconds by a special camera for permanent records.

The electro-optical pyrometer is an electronic thermometer. By comparing the intensity of two beams of light of different colors which emanate through a quartz window imbedded in the diesel cylinder wall the engineers compute a ratio which reveals the temperature within the cylinder.

Science News Letter, March 29, 1947

PHYSICS

Thin Tungsten Wire Is Invisible to Eye

➤ TUNGSTEN, the metal that is used for light bulb filaments, has been made into a wire that is so thin that a pound of it would stretch in a single strand 950 miles.

The wire is 0.00018 inch in diameter, and was produced by the Westinghouse Lamp Division for use in an amplifying tube for the Bell Laboratories.

One thousand feet of the thin wire, reeled on a bobbin, is invisible to the naked eye, and a 20-layer stack of the wire is about the thickness of a sheet of a newspaper.

Science News Letter, March 29, 1947

ASTRONOMY

Jupiter Joins Saturn

Giant planet reappears in the constellation of Libra low in the southeast late on April evenings. Saturn is high in southwest and sets about midnight.

By JAMES STOKLEY

➤ JOINING SATURN, for several months the only planet visible in the evening sky, Jupiter now comes into view. It is in the constellation of Libra, the scales, whose position, low in the southeast, is shown on the accompanying maps. These diagrams depict the skies as they appear about 10:00 p. m. at the beginning of April and 9:00 p. m. around the 15th. These hours are in your own kind of standard time.

A few months ago Jupiter was a brilliant morning star, visible in the east just before sunrise, close to Venus. Because the appearance of the skies, in general, advances two hours each month, at 10:00 p. m. this month they look about the same as at midnight in March, 2:00 a. m. in February, 4:00 a. m. in January and 6:00 a. m. in December. In recent months Venus has been moving eastward through the skies, so it is still a morning star, but Jupiter moves much more slowly and now it is coming into evening view.

Saturn Is High

Our other planet, Saturn, is high in the southwest. Due south at sunset, it sets around midnight. By that time, Jupiter has climbed near the meridian. Saturn, of magnitude 0.4, is considerably fainter than the minus 2 of Jupiter. It is in Cancer, the crab, one of the least conspicuous of the constellations of the zodiac, path of the sun, moon and planets. Much more prominent are the next-door figures of Gemini, the twins, to the right, with brilliant Pollux; and Leo, the lion, to the left. In Leo is a smaller group known as the sickle, first magnitude Regulus marking the end of the handle.

Next to Leo, along the zodiac toward the east, is Virgo, the virgin, with another star of the first magnitude, Spica by name. Above Virgo, in the east, is Bootes, the bear-driver, in which Arcturus shines.

In April evening skies the glorious constellations of the winter are making their last bow in the west. Orion is shown directly west, on the horizon, with Betelgeuse remaining visible. Nearby, farther south, is Sirius, the dog star, in Canis Major. To the right of Orion, shown in the map of the northern half of the sky, is Aldebaran, in Taurus, the bull. Though a star of the first magnitude, it is shown fainter on the map. It is so low that its light is dimmed. Above Taurus, in Auriga, the charioteer, is Capella. Shifting to the northeast, we can see Vega, in Lyra, the lyre, another brilliant star appearing fainter because it is so low. Vega, however, is now coming into view, and in the next few months it will be much more prominent, while Orion and his neighbors vanish completely for a while.

Venus Brightest

Of the other three naked eye planets, besides Jupiter and Saturn, only Venus is visible during the night. This, as mentioned above, is a morning star, in the constellation of Aquarius, which is low in the southeast at sunrise. Venus has a magnitude of minus 3.4, which makes it brighter than any other star or planet. Both Mercury and Mars are now too close to the sun to be seen.

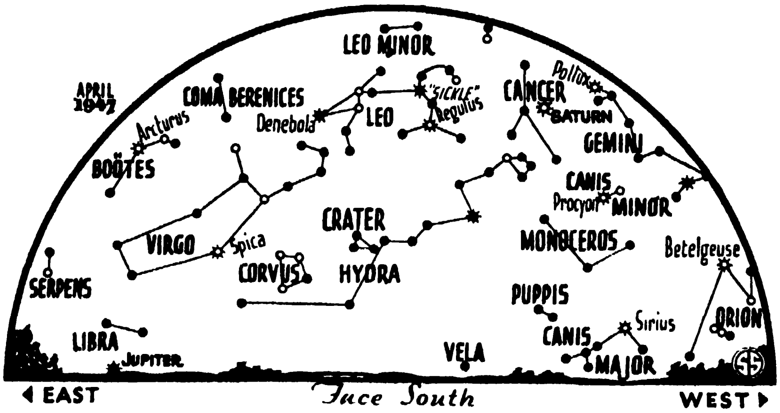
Of the 12 constellations of the zodiac—Aries, the ram; Taurus, the bull; Gemini, the twins; Cancer, the crab; Leo, the lion; Virgo, the virgin; Libra, the scales; Scorpius, the scorpion; Sagittarius, the archer; Capricornus, the sea goat; Aquarius, the water-carrier and Pisces, the fishes—Leo is the most famous. This is the figure which we see at its best on April evenings. However, its importance seems to come from the fact that the sun stands in the direction of Leo during the summertime.

Skies Rotate

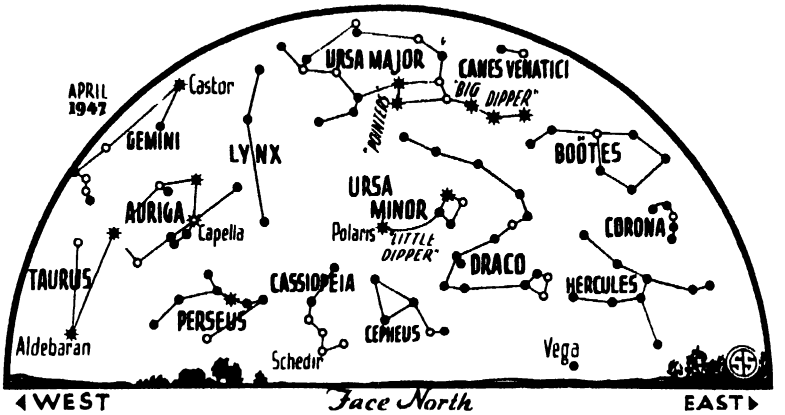
There is a slow movement of the skies, called the precession of the equinoxes, by which the constellations of the zodiac slip all the way around in about 26,000 years. At present the sun is in Leo during August and September. On Aug. 23, it passes Regulus. Thousands of years ago, when the constellations were established, it passed among these stars in June, when the sun was at its highest for the year. Thus there seemed to be a connection between this most ferocious of beasts and the ferocity of the hot sun at this time of year. The Greek poet Aratus wrote (in the second century B. C.):

> "The Lion flames. There the
> sun's course runs hottest.
> Empty of grain the arid fields
> appear
> When first the Sun into the
> Lion enters."

To the Egyptians there was another connection between this group and the species Leo. It was during the latter part of July, as the sun went through this figure for them, that the Nile attained its highest level. This brought the lions from the desert to the Nile Valley, to escape the heat. Perhaps as a result the Egyptians made use of the head of a lion on the gates of the canals connected with the Nile for irrigation. This is be-



☼ ✸ ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



lieved to be the origin of the lion's head figure in more modern fountains, where a stream of water squirts from the animal's jaws.

Celestial Time Table for April

April.	EST	
5	6:00 a. m.	Mercury farthest west of sun (but not far enough to be easily visible)
	10:28 a. m.	Full moon
8	4:47 p. m.	Moon passes Jupiter
12	8:00 a. m.	Moon farthest, 251,200 miles
13	9:23 a. m.	Moon in last quarter
18	12:37 a. m.	Moon passes Venus
20	11·19 p. m.	New moon
21	early a m.	Meteors of Lyrid shower visible
24	6:00 a. m.	Moon nearest, 227,800 miles
27	8·23 a. m.	Moon passes Saturn
	5:18 p m.	Moon in first quarter

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, March 29, 1947

ARCHAEOLOGY

4,000-Year Old Epic Poem Tells of "War of Nerves"

➤ A "NEW" EPIC poem, scratched in clay 4,000 years ago, is being translated by Dr. Samuel N. Kramer of the University of Pennsylvania Museum.

Unearthed half a century ago in the Near East, the poem is the oldest and longest Sumerian poem known. Sumer, where the ancient literature was written, was the southern division of ancient Babylonia.

The story told in the poem, which deals with events 1,000 years before the author wrote his epic, or 5,000 years ago, sounds like a modern tale. Dictators, psychological warfare and political intrigue are all important elements in "Enmerkar and the Lord of Aratta," the title Dr. Kramer has given the ancient work.

Smaller than an ordinary sheet of writing paper, the tablet on which Dr. Kramer found the poem was rediscovered by the archaeologist in the Museum of the Ancient Orient, Istanbul, Turkey. Dr. Kramer made his find during the past seven months while engaged in research in the Near East under the joint sponsorship of the University of Pennsylvania Museum and the American Schools of Oriental Research.

The small slab with the epic scratched on it is a 12-column tablet containing a record total of more than 600 lines of Sumerian poetry.

Enmerkar, hero of the poem, was a Sumerian hero who ruled the biblical Erech, a city-state in southern Mesopotamia. The epic tells how the ancient Sumerian used a "war of nerves" to capture a wealthy city nearby without bloodshed.

Dr. Kramer has translated enough of the ancient story to define clearly the main characters and the plot, but a full translation and interpretation will require further work.

Science News Letter, March 29, 1947

PHYSICS

Static-Reducing Devices To Aid Commercial Pilots

➤ CLEARER RADIO communications in bad weather and greater air safety are promised by simple wartime devices now being made available to commercial flying.

The devices are static dischargers and suppressors for shielding planes from accumulating static which disrupts radio communications in a storm. During the war, the dischargers and suppressors were credited with aiding safety of military planes, but all production went to the military. Now the devices have been released from government restrictions and are available to commercial flying, the Air Materiel Command said.

Consisting of a series of antenna insulators, tension units and conducting cotton wicking, the anti-static equipment is designed to fight precipitation static, which interferes with radio communications.

Precipitation static is set up in aircraft radio equipment when the electricity accumulated by the plane in flight is greater than in the surrounding air. This situation comes during storms and bad weather when dust, sand, smoke, ice crystals, snow crystals or rain strike against the surface of the plane and generate static electricity.

By shielding the plane and carrying off the accumulating static, the dischargers and suppressors reduce the interference with radio communications.

The Air Materiel Command laboratories at Wright Field developed the antenna insulation system during the war while the wick dischargers were made in cooperation with the Naval Research Laboratories. The equipment has been manufactured by Dayton Aircraft Products, Inc., Dayton, Ohio, under government contract.

Science News Letter, March 29, 194

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By H. T. PLEDGE

Librarian, Science Museum of London

FROM THE TABLE OF CONTENTS

SCIENCE AND PRE-SCIENCE—From Ancient Greece to the second Renaissance. Pre-science: isolation; lack of specialism; symbolism; mysticism. State of certain sciences 1450-1500: perspective and anatomy; mechanics; mines and chemical crafts; lack of physics.

BIOLOGY BEFORE THE MICROSCOPE—Mode of exposition adopted in the book. Weakness of botany without technical terms; teleology and science. Commentators, artists and doctors; naturalistic and diagrammatic plates; Vesalius; the Paduan line. Weakness of physiology without the idea of the physical; Harvey and the pump-idea. Lack of microscopes the limiting factor here and in early embryology.

ASTRONOMY BEFORE THE TELESCOPE—Experiment and observation. Earth and sun rival centres before the modern period. Technical advances and the great explorations; mapping; the Iberian contribution. Copernicus, Brahe, Kepler; the German contribution. Stirrings of the idea of the physical.

MATHEMATICS BEFORE THE CALCULUS—Some Greek points of view; rigour, music, and mysticism. Pure mathematics: Symbolism and suggestiveness; equations; Italian contribution. Computation: "calculating machines" preceded paper computation, which brings in a second dimension. Single-radix numeration; decimals; logarithms. Navigational astronomy as the stimulus.

THE 17TH CENTURY—War and order. Learned societies. Bacon and Descartes; philosophy and science; from the circle to the straight line as the "natural" path.

MECHANICS, ASTRONOMY, OPTICS, especially in the 17th Century—Stevinus, hydrostatics; Galileo, dynamics. Twofold importance of *glass:* telescopes and the end of Ptolemy, and barometers, defining the concept of a gas and of the physical. Thence, choice of mass as fundamental. Conservation principles in science. Gravitation, action at a distance. Light. Minimum principles in science. Waves and projectiles. 18th-century instruments. The idea of compensation: achromatic lenses and compensated chronometer.

MATHEMATICS (1600-1800)—Geometry restarts: from perspective to projective geometry; from mapping and equations to coordinates. Infinity: gradients and areas and infinite series. 18th century; analytical mechanics; minimal theories again; doubts of the calculus; the "insoluble" problems—quintics and elliptic integrals; the ambition of formulation.

MICROSCOPY, CLASSIFICATION, GEOLOGY—The descriptive and observational sciences. "Classical" microscopy, embryology, spontaneous generation, preformationism. Classifying, naming, comparing; relation to physiology; spirit formal and static; Linnaeus, Cuvier. Geology separates from cosmology; parts played by volcanoes, mines, etc., in its history; Guettard and Desmarets; Werner; Hutton; Cuvier.

THE 18TH CENTURY—Formalism and systematism; examples from medicine; reaction to revolution, political, agricultural, industrial. Premature applied science. Germany's greatness still ahead.

EXPERIMENTAL SCIENCE I—Interdependence of experimental physics, chemistry, and physiology. Heat and gases as key ideas; their confusion (17th century) and separation (18th). Vitalism and mechanism. Heat: thermometers, calorimetry, material theory. Chemistry: notes on technique. From principles (phlogiston) to substance (after Lavoisier) and weights. Oxygen monism. Gases again; atoms and Dalton. Application to physiology; respiration.

EXPERIMENTAL SCIENCE II—Qualitative electricity and magnetism. Physiology (Haller, Galvani) gives the sensitive detector needed for the discovery of currents; electrolysis. Dualism in chemistry; Berzelius and professionalism; atomic weights; analysis systematised. Organic chemistry; isomers, radicals, types; anarchy of the fifties. Physiology; the tradition of great teachers; the cycles, especially of nitrogen; digestion; nerves and senses, Helmholtz.

MATHEMATICAL PHYSICS—Certain ideas which always fascinate: vortices, crystals, waves; the second (*c.* 1800) leads to the triumph of the third in optics, but the first will be needed to complete the picture. Quantitative electricity and magnetism, ignoring dielectrics; historical importance of thermoelectricity; mathematicians and picture-thinkers. Kinetic theory, energy (contribution of physiology), thermodynamics, statistics. Radiant energy. Electromagnetic theory; vortices enter from hydrodynamics and unite electricity and optics.

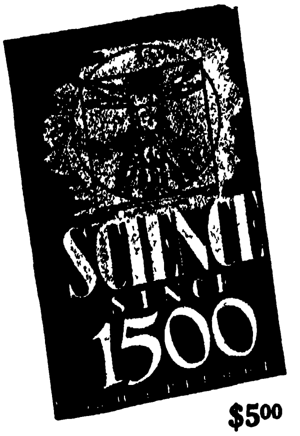
THE 19TH CENTURY—The world-wide spread of white man. The revolution opens the flood gates of French genius; the Romantic Epoch enchains Germany at first. Industrialism and the struggle for existence; mechanical models, statistics, continuity in English thought. Emergence of Germany.

EVOLUTION AND THE MICROSCOPE—Achromatic microscopes, giving cell theory. Naturphilosophie, morphology, embryology. The stage set for evolution. Buffon, Lamarck, the burst of hereditary aptitude in England. Influence of islands. Discussion of Darwinism. Distribution; the oceans; formalistic remnants expelled. Systematics: influences of conservatism, economics, and discoveries in physiology. The (non-Greek?) tradition as to infection. Jenner, Pasteur, Lister; staining and the microtome; the biochemical point of view.

19TH-CENTURY MATHEMATICS I AND II—Its philosophical character: rigour, generalised quantity and space. Gauss and theory of numbers. Continuity, function, complex variable. From quintics to algebraic numbers, many-unit quantities, generalised algebras; also to groups, transformations and invariants; thus to geometry: non-Euclidean and n-dimensional; projective geometry; Klein, Poincare; differential equations and mechanics; sets of points; towards general topology. Philosophy of mathematics.

(Continued on following page)

"A THOROUGH-GOING HISTORY OF SCIENCE"



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—*The Manchester Guardian*

FROM THE TABLE OF CONTENTS (*Continued*)

MAINLY ORGANIC CHEMISTRY—Experimental science again. End of the anarchy of the fifties in chemistry; groups of elements, homologous series; Avogadro's hypothesis; periodic law. Organic: crystals again, stereoisomerism; biochemistry and chemical industry; aromatics; typical constitutions. Notes on apparatus, especially chemical.

SURFACES AND IONS—Physical chemistry: balanced actions and thermodynamics. Electrochemistry; Raoult, osmosis; ionic dissociation theory, gas analogy. Colloids and surface chemistry. Catalysts and enzymes: surfaces again.

CYTOLOGY AND GENETICS—Cell division and union with the aid of new microtechnique; Weissmann. Ancient experiments in breeding; the part played by religious houses; pre-Mendel and Mendel; the gene; heredity and environment; the gene-complex; relation to evolution.

GROWTH AND UNITY OF THE INDIVIDUAL I—Embryology; cytological and evolutionary; experimental; technique of tissue culture; "rate genes." Nerves; neurons, integrative action; adrenaline and acetylcholine, importance of ultra-sensitive instruments; electrochemical models for nerve and muscle.

GROWTH AND UNITY OF THE INDIVIDUAL II—Internal secretion; dependence of our knowledge on antiseptic and other operative advances; the integration of the individual; plant hormones. Deficiency diseases; metabolic thermodynamics; vitamins. Some biochemical points: vitamins, pigments, respiration, and photosynthesis.

ECOLOGY—Pigments continued (vision); comparative biochemistry; the interrelations of life, that is, ecology. Its chief ideas and economic relations; soil science; parasitism, fluctuations, their mathematics and relations to evolution.

MODERN EXPERIMENTAL PHYSICS—Vacuum pumps and tubes; electrons; radioactivity; the planetary atom; atomic number; isotopes; projectile physics and new ultimate particles.

QUANTUM THEORY—Statistical and radiational theories and their erroneous result. Interferometers; line spectra, and no explanation. Quanta; Bohr; correspondence principle; matrices and wave-mechanics, probability and uncertainty; the relativistic equation.

RELATIVITY AND COSMOLOGY—The interferometer and special relativity. General relativity; efforts to geometrise electromagnetism. Astrophysics: Laplace's hypothesis and the alternatives; the spectroscope and spectral classifications; the galaxy; stellar evolution. Cosmological consequences of general relativity; Einstein and de Sitter; Milne and Eddington.

REAL MATERIALS I AND II—Subjects of Chapters XIV and XV revived by fresh elements from physics. crystals (once more) and X-rays; from valency to lattice and (with quanta) to the architecture of the solid state. Surfaces again; oriented films. Fibres and proteins; "templates." From ideal to real materials, real gases and electrolytes; reaction kinetics, activation, chains, reactions at surfaces; real liquids, vortices, boundary layers, in relation to the weather, ships and aeroplanes, real solids, geophysics.

CONCLUDING DISCUSSION • BIBLIOGRAPHICAL NOTE • SUBJECT INDEX • NAME INDEX.

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Children's Favorites

➤ WHEN CHILDREN come running and shouting, with the first violets clutched in their eager little fists, then we know it is really spring. Violets are not the first spring flowers to open, any more than robins are the first spring birds to appear; yet somehow their cheerful faces make us feel that this time it is spring and no mistake, no mere premature warm spell, deceiving us with false hopes. There may be more psychology than phenology about it, but that's the way we all feel.

Violets have a good, well-won right to their place as the proper heralds of spring. For all their delicacy and tininess, they are a hardy and adaptable tribe, that have spread their blue-and-yellow banners to all the cool winds of the world. There are something more than 300 species of violets, ranging through all temperate lands of the world. They are found on mountain-tops and in desert valleys below sea-level; some species grow with their roots embedded in the wettest of swamp muck, others precariously clinging to rock shelves. Violets are often thought of as exclusively woodland flowers, yet some of the most beautiful and hardy of them are to be found among the wind-blown grasses of the open prairie. Blues, yellows and white are their natural colors; one species, *Viola tricolor,* combines all three, and in the hands of generations of plant breeders has become the familiar garden pansy.

There is one encouraging thing to be noted about violets, too, so far as children are concerned. They may pick all they like, so long as they do not pull the plants up bodily by the roots. Violets do depend a great deal on seed for their propagation, but relatively few of their seed are formed by the bright little flowers that children love to gather. After spring has passed, the plants produce a second crop of flowers on very short stems down among the bases of the leaves. These flowers, which most of us would mistake for buds, have no petals and never open. They fertilize themselves internally with their own pollen, and thus insure well-filled seed capsules.

Science News Letter, March 29, 1947

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CHEMISTRY

Fermentation from Straw Makes Useful Chemicals

➤ INDUSTRIAL SOLVENTS, fatty acids and other useful chemicals are prepared from straw by fermentation with soil bacteria through the process on which a London inventor, Charles Weizmann, has obtained patent 2,417,801. He has found that if the bacteria are "encouraged" with easily fermentable carbohydrates, such as the starch remaining in bran, or the hexoses obtained by the partial hydrolysis of the celluloses in straw, they will act on the remaining undigested cellulosic substances, with profitable results.

Science News Letter, March 29, 1947

CHEMISTRY

Pulverized Silica Gives Luster to Varnishes

➤ DESIRED LUSTER of varnishes and lacquers can be obtained with the use of a new very highly pulverized silica revealed by the Monsanto Chemical Company. The material is so fine that there are 500,000,000,000 particles in a cubic inch, it is claimed.

The improved material, known as Santocel, is technically a gloss reducing agent. The individual particles in the varnish or lacquer finish project through the surface and kill the gloss by scattering the reflected light. Not enough roughness is added, however, to affect the feel of the surface.

The silica particles are porous and sponge-like and contain 94% air, it is estimated. They are nearly uniform in size. The new product is made from an older Santocel that contained about 500,000,000 particles per cubic inch, and is made by bombarding the particles against each other with highly specialized equipment.

Science News Letter, March 29, 19,7

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Books of the Week •

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ADDENDA TO THE NATURALIST'S LEXICON—Robert S. Woods—*Abbey Garden Press,* 47 p., paper, 25 cents. A condensed but comprehensive English-Classical key to descriptive nouns, adjectives and verbs used in the NATURALIST'S LEXICON (1944) arranged under 40 general headings.

ADVANCES IN GENETICS, Vol. I—M. Demerec, ed.—*Academic Press,* 458 p., illus., $7.50. A newcomer to the Annual Review series, for the field of genetics. Whether it will be published annually or as time, paper quotas and the like permit is not indicated.

BIOCHEMISTRY OF CANCER—Jesse P. Greenstein—*Academic Press,* 359 p., illus., $7.80. Studies in one field of cancer research which have yielded results of interest and significance are presented by the Head Biochemist of the National Cancer Institute.

CANCER CAN BE CURED—Alfred J. Cantor—*Didier,* 175 p., $2.50. Simple statements of the facts concerning cancer and a guide to early recognition of symptoms.

THE CHEMISTRY OF COMMERCIAL PLASTICS—Reginald L. Wakeman—*Reinhold,* 836 p., illus., $10. This textbook correlates scientific information with actual industrial practice. Literature references after each chapter suggest primary sources for additional reading.

CLINICAL PSYCHOLOGY OF CHILDREN'S BEHAVIOR PROBLEMS—C. M. Louttit—*Harper,* rev., 661 p., $4.50. A careful study of specific behavior problems included in a general discussion of the nature of problem behavior, its diagnosis, and treatment.

THE COOPERAGE HANDBOOK—Fred Putnam Hankerson—*Chemical Pub.,* 182 p., illus., $3.75. Giving all necessary information on the manufacture of barrels, their handling and storage, together with expert specifications and Interstate Commerce Commission regulations, this book on an age-old industry will guide shippers in the choice of satisfactory containers.

ESSENTIALS OF ENDOCRINOLOGY—Arthur Grollman—*Lippincott,* 2nd ed., 644 p., illus., $10. Completely revised, this survey covers the scope, history and methods of endocrinology, including the origin, nature and clinical uses of the hormones.

FEEDS OF THE WORLD; Their Digestibility and Composition—Burch H. Schneider—*Agr. Expt. Station West Va. Univ.,* 300 p., $3. Tabulations of all available data on feeds, their composition and nutritive value for cattle, sheep, goats, swine and horses have been painstakingly assembled. An exhaustive author bibliography, feed bibliography and dictionary of common and scientific names make this book a valuable information source.

FOSSIL VERTEBRATES FROM WESTERN NORTH AMERICA AND MEXICO—E. L. Furlong, E. R. Hall, L. R. David, R. E. Wallace, H. Howard—*Carnegie Inst.,* Publ. No. 551, 195 p., illus., paper, $2.50, cloth, $3. A series of papers deals with the Pleistocene antelope and birds, Pliocene badger, Upper Eocene fish scales, Upper Cretaceous fish and Miocene mammalian fauna.

INTERNATIONAL CONTROL OF ATOMIC ENERGY; The First Report of the United Nations Atomic Energy Commission to the Security Council, U. S. Dept. of State Publ. 2737, *Govt. Printing Office,* 100 p., paper, 25 cents. This report contains the basic principles first enunciated and consistently advocated by Bernard Baruch.

THE ISLAND WAR; The United States Marine Corps in the Pacific—Frank O. Hough—*Lippincott,* 412 p., illus., $5. Officially assigned to write this history, Major Hough, U. S. M. C., was granted access to confidential documents. The result is a brilliant discussion of the struggle for successive advanced bases, the men who performed the impossible, Japanese tactics, weaknesses, and battle conduct.

LIFE HISTORIES OF NORTH AMERICAN JAYS, CROWS, AND TITMICE; Order Passeriformes—Arthur Cleveland Bent—*Govt. Printing Office,* U. S. Natl. Museum Bul. 191, 495 p., illus., paper, $1.75. As full a life history as possible is given of the best-known subspecies of each species, with brief mention of the others. Egg dates and measurements and distribution and migration habits are included.

THE MAMMALS OF VIRGINIA—John Wendell Bailey—*pub. by the author,* 413 p., illus., $5. A full account of every kind of wild and domestic mammal known to have lived in Virginia, plus a list of fossil forms found in that state. The book is well indexed and has an excellent bibliography.

MATHEMATICAL RECREATIONS AND ESSAYS—W. W. Rouse Ball, rev. H. S M. Coxeter—*Macmillan,* 11th ed., 418 p., illus., $2.95. This first American edition of a classic will continue to divert amateurs of mathematics with its problems about ferry boats, school girls, cryptograms, and various arithmetical aand geometrical fallacies.

MEMOIRS OF THE SOCIETY FOR AMERICAN ARCHAEOLOGY; The Prehistory of Northern North America As Seen From the Yukon, Sup. to American Antiquity, Vol. XII, No. 3, Part 2—Frederica de Laguna—*Soc. for Am. Arch.,* 360 p., illus., paper, $3.50. This statement of the results of an expedition to the Tanana and Yukon valleys also attempts to relate its discoveries to previous work in the region by explorers and archaeologists.

THE NATURE AND PREVENTION OF THE CEREAL RUSTS AS EXEMPLIFIED IN THE LEAF RUST OF WHEAT—K. Starr Chester—*Chronica Botanica,* 269 p., $5. An account of the progress thus far made in the development of rust-resistant wheat serves as an aid for future efforts at solution of this continuing problem.

PHOTOELECTRIC CELLS—A. Sommers—*Chemical Pub.,* 104 p., $2.75. Stresses the points to be considered in selecting the most suitable photoelectric cells for a specific purpose and discusses the advantages of one type over the others.

PHYSICAL MEDICINE IN GENERAL PRACTISE Arthur L. Watkins, ed.—*Lippincott,* 341 p., illus., $5. The increasing interest in physical medicine makes this book especially timely. General practitioners particularly will welcome it.

PLANE TRIGONOMETRY—William Kelso Morrill—*Rinehart,* rev. ed., 245 p., $2.50. A textbook designed to make the student think, it includes problems in elementary physics, engineering, and navigation to illustrate the practical application of this branch of mathematics. Because it is more widely used to solve problems involving the right triangle than any other way, this is treated thoroughly.

ROCKETS AND SPACE TRAVEL; The Future of Flight Beyond the Stratosphere—Willy Ley—*Viking,* 374 p., illus., $3.75. A scientific record of efforts made in the field of interplanetary travel is detailed here, together with modern advances in rocket propulsion which begin to advance this idea to a stage of practical experiment.

THE SCIENCE DIGEST READER, *Windsor Press,* 310 p., $3. Oustanding articles published in *Science Digest* during the past ten years are collected in this volume.

SEMIMICRO EXPERIMENTS IN GENERAL CHEMISTRY—Jacob Cornog—Ginn, 217 p., illus., $2.50. This college text applies the time, space, and money saving advantages of the semimicro method to first year general chemistry.

UTILIZING HUMAN TALENT—Frederick B. Davis—*Am. Council on Ed.,* 85 p., paper, $1.25. This report of the Commission on Implications of Armed Services Educational Programs is an evaluation of the Armed Services aptitude testing, guidance and counciling programs with relation to admission and selection policies and practices in schools and colleges.

THE YEARBOOK OF PSYCHOANALYSIS, Vol. II—Sandor Lorand, ed.—*Int. Univs. Press,* 280 p., $7.50. Collection of contributions to psychoanalytic theory and practise and to applied psychoanalysis that appeared during 1946 in various foreign and domestic publications.

Science News Letter, March 29, 1947

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DOUBLE-UNIT light stand for photographers has a sturdy cross-beam rod that holds a light and a reflector at each end. Made in two sections, it can be extended to a height of 10.5 feet, and telescoped for easy carrying to 3.5 feet.

Science News Letter, March 29, 1947

PHONOGRAPH NEEDLE, boot-shaped, molded of nylon, has a jewel tip to follow the groove in the record. The elasticity of the nylon protects the stylus, keeping it always in line with the shank and preventing it from jumping out of the groove.

Science News Letter, March 29, 1947

GAS ANALYZER, which makes use of infra-red or heat rays, can detect one part of carbon monoxide or carbon dioxide in 50,000 parts of air. It can make a continuous, automatic analysis of any gas capable of absorbing infra-red rays and measure its concentration in a mixture.

Science News Letter, March 29, 1947

BUTTER CHURN for home use has an aluminum dasher operated by a tiny electric motor in a housing that fits on the top of a glass jar. It makes butter in 15 minutes. Its dasher is detachable and is easily cleaned.

Science News Letter, March 29, 1947

GLASSES for persons who have had cataract operations are available in a lightweight form which has the corrective part in the center of the lens. This is large enough to cut out the ultraviolet rays normally absorbed by the lens of the eye. The picture shows the new glasses on the lady as contrasted with the old type on the man.

Science News Letter, March 29, 1947

BOTTLE CARRIER, for use in handling bottles of acids or other chemicals in laboratories or factories, is made of heavy duck, impregnated on both sides with chemical-resistant synthetic rubber. Carrying straps of double thickness run completely under the load.

Science News Letter, March 29, 1947

JAR CAP REMOVER for household use in loosening the tops of glass fruit containers is a wall fixture with a hand crank and a chain of links to pass around the edge of the cap. A turn of the crank tightens the links, causing them to grasp the cap firmly and revolve it.

Science News Letter, March 29, 1947

PHOTOGRAPHIC analyzer enables an amateur photographer to make good prints, because it accurately appraises the value of a negative as to density and contrast range. It determines definitely correct printing exposures and controls many other processes.

Science News Letter, March 29, 1947

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Question Box

AERONAUTICS

What is unusual about the flying wing YB-49? p. 194.

What kind of stations will open the Great Circle route in bad weather? p. 197.

ASTRONOMY

What is the brightest planet in April skies? p. 202.

BOTANY

Why can children pick all the violets they want without interfering with propagation of the species? p. 206.

ENGINEERING

What are the five major sources of synthetic fuels? p. 198.

NUTRITION

Has Europe had much post-war vitamin deficiency disease? p. 195.

PHOTOGRAPHY

How did the OSS secretly take and develop pictures during the war? p. 195.

PSYCHOLOGY

What narrows "brain maps?" p. 199.

PHYSICS

What fissionable materials in your home will be scarce? p. 194.

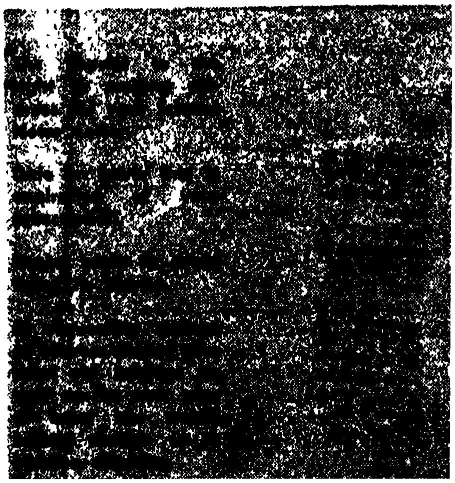
PLANT PHYSIOLOGY

How does 2,4-D kill plants? p. 200.

VETERINARY MEDICINE

Why must the carcasses of diseased livestock be buried so deeply? p. 196.

Where published sources are used they are cited.



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SCIENCE NEWS LETTER

A SCIENCE SERVICE PUBLICATION

Television gives you a choice seat at the game.

Television—a Season Pass to Baseball!

Every home game—day or night—played by the New York Giants, Yankees and Brooklyn Dodgers will be seen over television this season!

Owning a television receiver in the New York area will be like having a season pass for *all three ball* clubs. And in other cities, preparations for the future telecasting of baseball are being made.

When more than one home game is on the air, baseball fans can switch from one to the other—see the most exciting moments of each through television!

Those who own RCA Victor television receivers will enjoy ***brighter, clearer, steadier*** pictures through the exclusive RCA Victor Eye-Witness picture synchronizer that "locks" the receiver in tune with the sending station.

To witness baseball or any other event in the ever-growing range of television programs—you'll want the receiver that bears the most famous name in television today—RCA Victor.

When you buy an RCA Victor television receiver or radio, or Victrola radio-phonograph, or an RCA Victor record or a radio tube, you know you are getting one of the finest products of its kind science has achieved. "Victrola" T.M. Reg. U.S. Pat. Off.

Radio Corporation of America, RCA Building, Radio City, New York 20. Listen to the RCA Victor Show, Sundays, 2:00 P.M., Eastern Standard Time over the NBC Network.

Several television cameras cover the baseball diamond to bring you a close-up of the action wherever it occurs. Here is a supersensitive RCA Image Orthicon television camera used by NBC's New York station WNBT in televising home games of the New York Giants.

RADIO CORPORATION of AMERICA

22 MAY 1947

MEDICINE

Cosmic Rays in Cancer

Cosmic rays may cause cancer. Experiments link these rays to the disease, and further study will tell more about their role in cancer.

COSMIC RAYS, which continually bombard us, piercing our bodies from head to toe at a rate of more than 20 times per second, may be the invisible guns that start off cancers.

Experiments which for the first time link cosmic rays with cancer are reported by Dr. Frank H. J. Figge, of the University of Maryland Medical School, in *Science* (March 28).

We will not have to spend our lives in underground shelters to escape cancer-causing cosmic rays, although Dr. Figge does suggest some change in the structure of our buildings. Plastic material might be better than steel and concrete.

The cosmic rays start cancer, he believes, by activating certain chemicals in the body. Some persons may apparently have greater amounts of these chemicals in their bodies than other persons. After all, Dr. Figge points out, not everyone gets cancer.

Avoiding Cancer

The way to avoid cancer, if Dr. Figge's theory proves correct, is to identify the chemicals the rays act on and then to find some way of eliminating or counteracting them.

These chemicals, which Dr. Figge calls sensitizers, are what led him to his new theory of the way cancer starts. Porphyrins, for example, which form the basis for the respiratory pigments such as the hemoglobin of red blood cells, are sensitizers to radiation on the electromagnetic spectrum. Porphyrins occur in abundance in animals susceptible to experimentally induced cancer. About 10% of women produce large amounts of them around the neck of the uterus, or womb, at regular periods. And cancer of the neck (cervex) of the uterus is responsible for about one-third of all cancer in women.

To test his theory, Dr. Figge injected mice with the cancer-causing chemical, methylcholanthrene. He placed some of them in cages with one and two lead plates over the cages. Others were in cages without lead plates. The cages were placed some on the first and some on the fifth floors of a steel and concrete building. The arrangement of cages and plates was such that some mice, those under the lead plates, would be subjected to showers of more intense cosmic radiation, while others would get only the amount usually found in the atmosphere.

All but two of the 67 control mice and one of the 111 lead-covered mice got cancer. This was to be expected. But the mice under the lead covers developed cancer three weeks earlier, on the average, or in about two-thirds the time, than the mice not under lead covers.

Next week Dr. Figge is going to put on what should be a more conclusive experimental test of his theory. He is going to inject mice with the cancer-causing chemical and then take them 700 feet below the surface of the earth in three coal mines near Pottsville, Pa. At that depth, the mice will not be reached by any cosmic rays. If they fail to develop cancer, it will prove that cosmic rays start off cancers by acting on certain chemicals in the body.

For the duration of the experiment, probably six months, Dr. Figge will go down into the mines every week to examine the animals. Some of the miners will feed and water the animals and clean their cages in between his visits. Both miners and operators, he says, have been very cooperative.

The fact that the total energy received by the earth as cosmic radiation is no greater than that of starlight has led many to assume that cosmic rays could have little, if any, effect on plant and animal life. Yet a number of known facts support the cosmic ray-cancer theory.

Most Attacks

Cancer attacks people in greater numbers the farther one gets from the geomagnetic equator of the earth. This equator, which lies near but does not exactly parallel the equator of school geography books, is where cosmic radiations are least intense. They grow more intense, and cancer is more frequent, the farther one gets both north and south of the geomagnetic equator.

Farmers and others who live most of their lives outdoors are less subject to internal cancers than persons spending most of their lives in buildings which produce cosmic ray showers and thus intensify the radiation. The skin cancers to which farmers, sailors and others living largely outdoor lives are most subject, are primarily due, Dr. Figge explains, to rays from the sun. And the amount of skin cancer increases as one approaches the equator.

Science News Letter, April 5, 1947

BLOWING ARMS—Glass-blower's skill is still needed in making intricate radio transmitting tubes. Here a grid connection arm is being attached to a 100,000-watt tube in a General Electric laboratory.

Linlithgow Library.

PSYCHIATRY

"Southpaws" Are Made

People learn left-handedness instead of inheriting it and should be taught to use their right hand. Three causes of left-handedness are suggested.

➤ YOU ARE RIGHT- or left-handed because you learned to be, not because you were born that way and inherited it. Children in our right-handed civilization should be taught to be right-handed.

This revolutionary new theory, that "southpaws" are made, not born, is put forward by Dr. Abram Blau, assistant clinical professor of psychiatry at the New York University College of Medicine and chief psychiatrist at the New York University Clinic.

The newborn infant, according to the new theory, is bilateral with no developed handedness and laterality. This state of no-handedness is typical of animals and primitive peoples. Theoretically, the human baby has a 50-50 chance of becoming either right- or left-handed.

But in humans, Dr. Blau explains, "preference for the right side is a cultural and social convention.

"As soon as we are born, society steps in and commands: 'Thou shalt use thy right hand and not thy left hand!'"

In "The Master Hand," a study of sidedness published by the American Orthopsychiatric Association, Dr. Blau lists three reasons why there are left-handed people in our right-handed society.

One cause of sinistrality, or left-sidedness, may be either physical or mental deficiency, Dr. Blau says. Loss of the right hand or arm or some physical defect may force a person to become left-handed. Mental deficiency may hamper a person from normal learning of dextrality, or right-sidedness.

"Low-grade mental defectives," Dr. Blau explains, "are not ambidextrous but ambilateral; they have little dexterity on either side."

"Faulty education" is suggested as a second cause for left-handedness. According to the new theory, the left-handed parents are frequently imitated by their children, who learn to be left-handed, too. This accounts for many cases of seeming inheritance of left-handedness, Dr. Blau believes.

Another type of left-handed education stems from the idea that it is dangerous to change apparently left-handed children to use of their right hand.

He believes the third and most common cause of left-handedness is "emotional negativism." This is simply an active emotional contrariness in early childhood.

Science News Letter, April 5, 1947

PHYSICS

Preventing Air Eddies

➤ HOW AIR EDDIES in aviation wind tunnels are eliminated by fine screens, and the development of the method, are revealed in a new report of the National Bureau of Standards.

These eddies, usually referred to as turbulence, create air movements unlike those encountered by a plane traveling through still air. The use of the screens makes turbulence level so low that motion through the air is actually simulated. The use of screens is a development of the National Bureau of Standards in active cooperation with the National Advisory Committee for Aeronautics.

As far as known, the Bureau states, the first observation of a damping effect of a screen on turbulence was made in 1934 in the old Bureau 4½-foot wind tunnel. A little later, it was observed at NACA laboratories at Langley Field, Virginia, that the steadiness of the air flow through a smoke tunnel was improved by the use of a cloth over the tunnel entrance. However, the usefulness of damping screens was not realized until 1938, when measurements were made by the Bureau showing the amount of turbulence reduction. A year later, the Bureau undertook a systematic investigation with the cooperation and financial assistance of the NACA.

Wind tunnels are devices to produce artificial wind for the testing of scale models of planes or of plane parts. Smoothness and uniformity of air movement in the tunnel are essentials. The swirling is due to the fact that the air in the tunnel must move over or around such solid objects as walls, guide vanes and propellers.

The most highly developed use of screens to eliminate turbulence is probably in the Moffett Field, California, tunnel completed by the National Advisory Committee for Aeronautics in 1946. This tunnel has a large spherical bulge in which are stretched eight fine-mesh wire screens spaced nine inches apart, each one over 60 feet in diameter. The bulge is just ahead of the test section. The screens effectively eliminate nearly all swirling or turbulence in the air stream.

Science News Letter, April 5, 1947

SCIENCE NEWS LETTER

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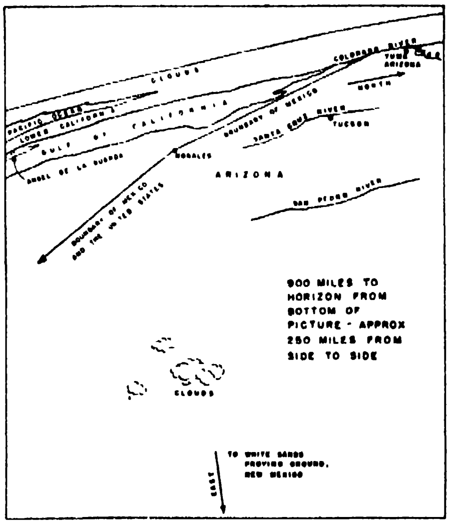


LANDMARKS—This diagram, drawn by the Navy, shows landmarks that can be seen on the photograph of the earth.

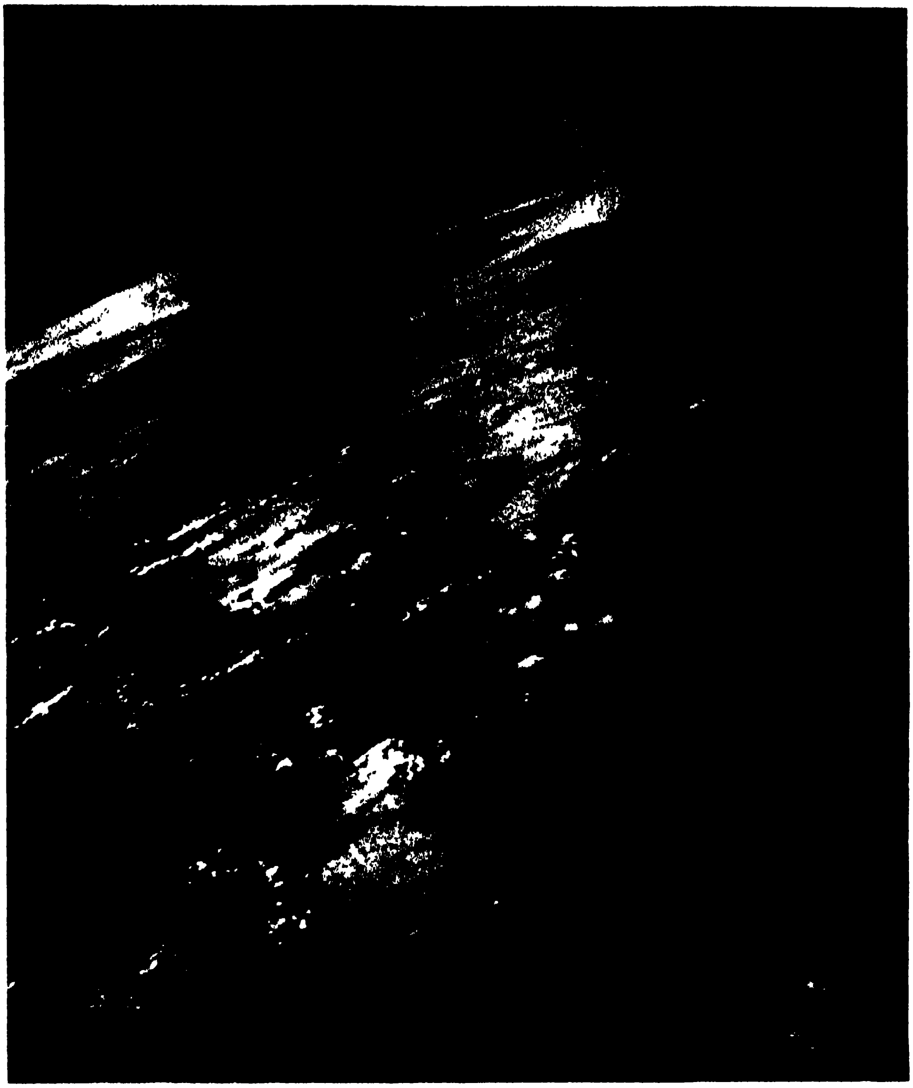
METALLURGY

Tougher Alloys Needed For Jet Engines' Heat

➤ METAL ALLOYS to withstand the the extreme temperatures in jet-propulsion engines was discussed in Cleveland by the National Aircraft Propulsion meeting, Institute of Aeronautical Sciences.

Much progress has been made in developing alloys for jet engines but none are entirely satisfactory. J. W. Freeman, research engineer of the University of Michigan, made what he called some guesses as to future prospects of improved materials. He discussed the fundamental metallurgical principles controlling the properties of the alloys for the types of services, and reviewed the results of chemical composition, heat treatment and processing procedures to date.

Science News Letter, April 5, 1947



FROM 100 MILES UP—Taken from a V-2 rocket, this is the highest point from which the earth has been photographed. U. S. Navy photo.

PHOTOGRAPHY

Rocket Cameras Photograph Earth From 100 Miles Up

➤ FROM 100 miles above the earth, V-2 rocket aerial cameras took a picture that shows the curvature of the earth and more than 200,000 square miles of the United States and Mexico. This is the highest a picture has ever been taken.

Two aerial cameras, carried amidship in the rocket launched at White Sands, N. Mex., on March 7, took pictures through an infra-red filter to cut the haze. Since the force of the rocket blasts a crater into the ground when it returns to earth, the nose and tail of this rocket were blown off by explosives detonated by radio signals to make recovery of cameras easier.

The spectrograph was recovered also, and Navy scientists are studying spectrogram films of the sun taken at an altitude of 100 miles. The Navy and Army are cooperating on the V-2 flights for scientific purposes.

This particular rocket flight was successful in gathering valuable new information in the fields of upper atmospheric pressures and temperatures, cosmic rays, ionosphere investigation and studies of solar spectra.

The time of flight of the rocket was six and one-half minutes.

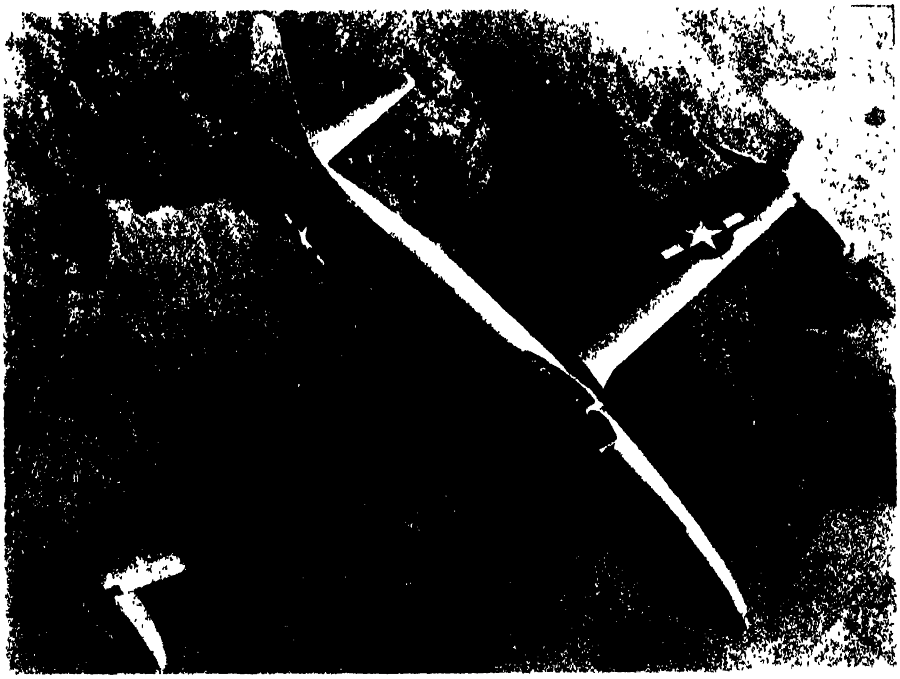
Science News Letter, April 5, 1947

ENGINEERING

Liquid Propellant Cools Rocket Engine in Motion

➤ A METHOD of cooling a rocket engine was discussed by Thomas E. Reinhardt of Bell Aircraft Corporation at the National Aircraft Propulsion meeting, Institute of Aeronautical Sciences. Regenerative cooling of a liquid propellant rocket is accomplished, he said, by flowing one of the liquid propellants through a jacket surrounding the combustion chamber and nozzle. The liquid cools the walls of the chamber to a safe operating temperature, and at the same time is itself pre-heated, thereby aiding combustion.

Science News Letter, April 5, 1947



"SHOOTING STAR"—The Army has contracted for an improved version of the Lockheed P-80 jet fighter shown in this Army Air Forces photograph.

DENTISTRY

Live Teeth Grafted in Cats

Fourteen cats have tooth germ grafting. Tooth banks for human teeth are predicted, but knowledge of bones and blood vessels is needed.

➤ POSSIBILITY of tooth banks being developed at some future date, from which "live" teeth could be obtained as replacements for those that have to be extracted, is seen in studies made by Dr. Harry H. Shapiro of Columbia University.

The first step in this direction has been taken with cats. A developing tooth or "germ" has been removed from a donor cat and grafted into the socket of a host cat from which a tooth had just been removed. The procedure has been carried out in 14 cats. Hosts were older than donors, ranging in age from six months to one year.

X-ray examinations were made before and after the operations and were continued throughout the development of the tooth germ. The germ, not to be confused with the kind that causes disease, is not more than a few millimeters in diameter and its intact removal is a delicate operation.

In cases where the donor tooth was not injured during transplantation, it developed and grew normally. This was true whether the transplant was the same kind of tooth as the one removed from the host or another kind, as when an incisor was substituted for a canine.

Cats were chosen for the work because the growth cycle of teeth in cats is most like that in humans, and proceeds rapidly so that results could be determined fairly soon. Kittens, like human babies, are born without teeth, acquire a first or "baby" set which they lose and then get a second permanent set. And cats reach maturity in nine months.

Before the results can be applied to humans, much more will have to be learned of bone regeneration, blood vessel regeneration and developing tooth structure. Dr. Shapiro himself will not make any predictions on the future possibilities for humans. Some time ago he received a letter from a Californian placing an order for several transplants, "preferably molars." This is the kind of thing he wants to discourage and prevent.

Dr. Shapiro started his tooth transplants in 1940. Sharing his work was his wife, Dr. Bernice L. MacLean, who died last year. Two of the cats with transplanted teeth were shown at a meeting of the American Association of Anatomists at Cornell Medical College.

Science News Letter, April 5, 1947

AERONAUTICS

New Edition of Army P-80 "Shooting Star" On Way

➤ A NEW EDITION of the Army's jet-propelled P-80 "Shooting Star", to be known as the P-80B, is on the way.

The Army Air Forces have awarded the manufacturer of the P-80, Lockheed Aircraft Corporation of Burbank, Calif., a contract for a stronger plane of the P-80 type with greater firepower.

New features for the P-80B include:

Thicker skin and stronger bulkheads with a sturdier base for armament.

Stainless steel around the engine for greater fireproofing.

Water injection in the J-33 turbo-jet engine to increase take-off and climb performance.

Natural aluminum finish to get away from the chipped paint which mars the P-80 after it has flown through a rainstorm.

Enclosed radio masts and antenna wires to reduce the drag of the equipment at high speeds.

Refrigeration system to give more comfortable cockpit temperatures at all times.

Science News Letter, April 5, 1947

PHYSICS

X-Ray Application Made With Electron Microscope

➤ THE PRINCIPLE of the electron microscope is applied in the production of X-rays for the purposes of spectrographic analysis in a setup designed by one of the leading workers in the field, Dr. James Hillier of the Radio Corporation of America, to which firm he has assigned his patent, No. 2,418,029. A beam of electrons is focussed in the customary way on the object to be analyzed. Striking it, the electrons cause the emission of X-rays. A beam of these, screened through a pair of slits, strikes a crystal, which scatters them in characteristic diffraction pattern and permits a photographic record to be made.

Science News Letter, April 5, 1947

CHEMISTRY

Nylons From Corn Cobs

Sheer stockings will come from the farm. Furfural, obtained from the raw material, is the chemical from which nylon is built.

➤ THOSE LOVELY, sheer nylons—they are going to be synthesized from corn cobs and oat hulls instead of coal, air and water.

Chemists have discovered how to make nylon plastic from waste products from the farm, and Du Pont has begun constructing a new plant at Niagara Falls to make the chemicals of the new nylon process from furfural, a chemical curiosity of a quarter of a century ago.

"Over 100,000 tons of agricultural by-products will be needed to supply the furfural needed by the new plant," Dr. O. W. Cass, of Du Pont's Niagara Falls Research Laboratory, told the Chemurgic Conference in Oklahoma City.

Nylon stockings, panties and other products will be grown down on the farm so far as their basic raw chemical materials are concerned. Now the nylon raw materials are obtained from natural gas, petroleum or coal—and air and water.

"We can now make nylon from materials which are available in practically unlimited quantities because they are grown each year," Dr. Cass explained.

The starting point of furfural, chemical raw material for the new nylon process, may be any one of a wide variety of agricultural by-products—oat hulls, corn cobs, cottonseed hulls, flax shives, bagasse from sugar cane, peanut shells, rice husks or even wood.

One bushel of corn cobs makes 40 pairs of stockings, so far as the basic chemical is concerned, but other chemicals than the principal one are also needed.

A dozen years were required to develop the new nylon process, and laboratory research began in the fall of 1935, three years before nylon was announced to the public. The fundamental nylon process took over a decade of research and pilot plant work.

Two intermediate chemicals that nylon wearers never hear about are combined to produce the finished nylon material. These are called adipic acid and hexamethylene diamine. The conventional process uses phenol or benzene from coal, ammonia from air and water, and oxygen from air.

The new process announced by Dr. Cass starts with the furfural from cobs or hulls, converts it into adiponitrile and then makes hexamethylene diamine.

A new field of chemistry, based on furfural, and called furan chemistry, was predicted by Dr. Cass, who rated nylon production as just one of many future chemical achievements based on utilization of this kind of waste material.

Science News Letter, April 5, 1947

MEDICINE

Portal-to-Portal Cleaning Protects Drugs From Dust

➤ HERE'S ONE John L. Lewis and his coal miners seem to have overlooked: portal-to-portal, or at least portal-to-job, dry cleaning of employees' clothes.

It is one of the special features of the new drug manufacturing plant of the Winthrop Chemical Company which recently went into operation.

The object is to keep every speck of dust out of the medicinals made there for hypodermic injection into sick people. Before entering the main building where the medicines are made, employees and visitors must walk through one of two narrow passages lined with double de-dusting blowing and suction units designed to remove lint and dust from their clothing. The 35 compartmented laboratory workrooms where the medicines are prepared are isolated, germ-proofed and air-conditioned for protection of the medicines. Nose and mouth masks and specially designed dust-free gowns must also be worn by everyone entering the weighing, preparation and filling rooms.

Science News Letter, April 5, 1947

SPICK AND SPAN—In addition to "portal-to-portal" dry cleaning of workers' clothes, this room of the Winthrop laboratories has a special vestibule made to insure 30% humidity. Workers wear lint-free masks and gowns and weigh powders under glass hoods.

OPTICS

Flare-Absorbing Lenses Protect Glassworkers' Eyes

➤ GLASSWORKERS, fusing glass in sodium flares, are enabled to see work otherwise hidden by the yellow flame by means of new eyeglasses revealed by the American Optical Company.

The lenses of the new eyeglasses contain standard optical glass to which is added a small quantity of a rare metal, didymium. Lenses made of this special glass absorb 90% of the yellow sodium flare of the fusing flame which is caused by the burning of sodium, one of the ingredients of glass. They permit the worker to look through the opaque yellow light emitted and see his work clearly. They protect workers also from the headaches that usually accompany extended work with sodium flames.

Science News Letter, April 5, 1947

PHYSICS

German Microphone Used To Detect Enemy Planes

➤ ANOTHER GERMAN device for detecting approaching airplanes is now revealed. It is a hot-wire microphone, said to be superior to the older electrostatic and eletcromagnetic types.

This microphone is for use on patroling aircraft. Unlike other types it does not pick up mechanical vibrations produced by the carrier plane. It is particularly sensitive for sound waves between 50 and 250 cycles per second. With higher cycles its sensitivity decreases considerably.

The microphone looks like a slender projectile about eight inches long. The sound waves enter the microphone by means of six slotted openings at right angles to the throat of a resonator and to the main axis of the device. The throat contains a platinum wire heated by a battery power unit. The temperature of the wire varies with the changing pressure of the sound waves on it. The change in temperature alters the amount of power the wire draws from the battery. A meter indicates the presence of a train of sound waves.

A report on this hot-wire microphone, "A Microphone of the Hot Wire Type," prepared by a British investigator, may now be obtained from the Office of Technical Services, U. S. Department of Commerce, for one dollar. Its 10 pages include diagrams and graphs.

Science News Letter, April 5, 1947

MEDICINE

Cancer Kills Almost As Many Men as Women

➤ THE NOTION that cancer is primarily a woman's disease is false, the American Cancer Society states. In 1946, it is estimated, cancer killed 87,777 males and 93,723 females in the United States. The difference is only 6%.

The reason many people think of cancer as a woman's disease is probably because of the large amount of cancer in the female sex organs. Cancer of the uterus accounts for 19% and cancer of the breast for 18% of the cancer deaths in women. While cancer of the breast can occur in men, it is relatively rare.

When it comes to cancer of the stomach and digestive system, male deaths outnumber female by about 7,000 each year. U. S. Bureau of Vital Statistics reports for 1944 show 42,351 deaths among men from cancer of the digestive system as compared to 35,637 among women. Finally, more men than women die of cancer of the skin, mouth and pharnyx, lungs, nervous system, urinary tract and other sites.

One-fourth of the people attacked by cancer are saved by treatment with radium or X-rays or surgical operations. Another fourth die, but could be saved if the cancer were detected early and promptly treated. One-half of the people who meet with cancer, states the American Cancer Society, are dependent on new discoveries looked for from development of research. During this month the Society will put on a campaign to raise $12,000,000 to support research, education and service for the fight against cancer.

Individuals should continue to make their own fight against cancer by consulting a doctor promptly if they have any of the symptoms that might mean cancer, such as unusual bleeding, persistent indigestion, persistent hoarseness, lump in the breast or unusual appearance of the breast, and a sore that does not heal promptly.

Science News Letter, April 5, 1947

BOTANY

White Pines Are Growing In Guatemala and Mexico

➤ WHITE PINES, usually thought of as distinctly northern trees, have recently been found growing on mountainsides in the tropics. Prof. Aaron J. Sharp of the University of Tennessee reports two communities of white pines in the mountain ranges of Guatemala, at elevations above 4,300 feet. Another group had previously been reported from Chiapas, southernmost Mexican state, by a Mexican botanist, Dr. Maximino Martinez.

Except for a slight difference in leaf structure, which marks them as a distinct variety, the trees are identical with the species *Pinus Strobus,* in which they are included, which reaches its southernmost known limit in the high mountains of northeastern Alabama and Georgia.

Prof. Sharp states that the two stands of pines he studied in Guatemala were associated with a number of other species of definitely northern aspect, such as boxelder, sweetgum, black cherry, sugar maple, oak, ash, elm, wild grape, dogwood, and several ferns familiar in the United States.

Science News Letter, April 5, 1947

IN SCIEN

ASTRONOMICAL PHYSICS

Astronomers' Methods Aid Rocket Study Techniques

➤ TECHNIQUES used by astronomers studying the sun and other heavenly bodies are helping rocket studies, aimed at producing a missile superior to the Nazi V-2.

Problems which astronomical methods are helping solve for General Electric engineers studying rockets are how to take the temperature of rocket gases too hot for conventional instruments, and how to measure the velocity of the gases.

Adapted from the astronomers' measuring methods for the heat of distant stars and the speed of the sun's rotation, means of gathering information on the performance of rockets have been developed which will help in the design of more efficient motors and fuels.

Temperature of the rocket gases is taken by study of the wavelengths of molecular radiation. The light of the rocket flame is turned into a spectrum by means of lenses and prisms. Energy released by hydrocarbon molecules is recorded on a photographic plate and interpreted by means of a micro-densitometer, an intricate photoelectric device. In the V-2 rocket, the temperature of the gases is approximately 3,500 degrees Fahrenheit. Astronomers in the past have used a similar method to take the temperature of a comet's tail.

Wavelengths of the radiation from sodium atoms in the flame are photographed, using two periscopes, to help determine the velocity of the gases. Speed of the atoms approaching and leaving in the exhaust of the rocket are compared with stationary sources to calculate the velocity.

Basis of the speed determination procedure is the well-known Doppler effect, which uses the speed of an object toward or away from a certain point. Velocity of the superheated gases is compared with the velocity of light, as astronomers have calculated the speed of the rotation of the sun.

Dr. Francis P. Bundy and Dr. Herbert M. Strong, research physicists, devised the rocket test methods.

Science News Letter, April 5, 1947

E FIELDS

VETERINARY MEDICINE

Blood Bank for Animals Provides for Transfusions

➤ A BLOOD BANK for horses, cows and dogs is operated at the State College of Washington as an aid to valuable animals that may become seriously sick, also as material for research in veterinary medicine.

Blood is collected, preserved and transfused by methods adapted from human medical practice. Animal donors are lightly anesthetized before blood is drawn from their veins, and great care is exercised to avoid draining too much from any individual. The blood is kept as whole blood until it is too old to be useful as such; then its plasma is withdrawn and preserved.

The animal blood bank had its inception not long before Pearl Harbor, but little has been made public about its work until now. It is maintained by successive groups of senior students, under the direction of Dr. J. E. McCoy.

Science News Letter, April 5, 1947

DENTISTRY

Daily Lemon Juice Dose Etches and Destroys Teeth

➤ DAILY LEMON juice drinking destroys the teeth, two dentists at the Mayo Clinic in Rochester, Minn., warn. The dentists are Drs. Edward C. Stafne and Stanley A. Lovestedt.

They report on 50 patients who were taking lemon juice as a health measure and who also showed evidence of their teeth having dissolved away. In one case the upper front teeth were destroyed to the gum line. This was a man who for years had drunk lemon juice in water on arising.

Of the 50 patients, 39 were women and 11 were men. They came from 22 states, two Canadian provinces, Mexico and Puerto Rico, suggesting that the use of lemon juice as a health measure or a remedy is widespread.

The use of lemon juice was most common among sufferers from rheumatism. It was also used by some of the 50 for treatment of constipation, to prevent and relieve colds and occasionally as a tonic.

In most cases the destruction of the teeth was found in a general physical examination, but in a few the dental defect was the reason the patient came to the clinic.

The etching and decalcification of teeth by the action of the acid in lemons has been noted long ago, but until recently this was limited to certain peoples and geographic regions. Now that lemons are widely available, they are being consumed to a much greater extent. Because of their vitamin C content, this has been a help on the nutritional score, the dentists point out. They state, however, that enough vitamin C can be got without resorting to improper use of lemons. By improper use they mean: 1. sucking on lemons, which is not very common; 2. taking lemon juice daily in appreciable concentration.

Science News Letter, April 5, 1947

OPHTHALMOLOGY

New Methods Find More Congenital Cataracts

➤ THE NUMBER of known types of congenital cataracts, which are to be found in every human eye, has been greatly increased in recent years by new scientific methods.

Increase in knowledge of the different types of congenital eye abnormalities has been made possible largely by the development of the slit-lamp and the corneal microscope for study of the dilated pupil, says Dr. Frederick C. Cordes, professor of ophthalmology in the University of California Medical School.

Most congenital cataracts are stationary and cause no interference with vision, many individuals never realizing they exist. Some such cataracts are simply dust-like opacities in the eye.

However, in 50% of cases there are other ocular disturbances, such as dimness of vision and involuntary movement of the eyeballs, Dr. Cordes states.

Some cataracts have a hereditary tendency, while others may be caused by injury, infection or toxic substances administered during pregnancy. Vitamin deficiencies in the mother and interference with her calcium metabolism can also cause cataracts.

"A clear lens, one in the sense of a good photographic or microscope lens, is probably non-existent in the human eye," Dr. Cordes states. "Practically all lenses, even those of young children, show some dust-like opacities."

Science News Letter, April 5, 1947

BIOLOGY

Single-Celled Animals Affected by Insecticide

➤ BENZENE HEXACHLORIDE, the new British insecticide, has strange effects on the single-celled citizens of the microscopic world, Dr. Ll. Lloyd of the University of Leeds has discovered. When paramecia, normally neat little slipper-shaped swimming animals, are kept in water containing the poison in dilutions of from one to ten parts per million, they lose their power to divide and form new individuals. Instead, they slowly grow larger, until they are 50% longer and broader than normal. After a while the poison finishes its work, and they die.

Freak forms have also been observed in some of the lower-strength solutions. Here the cells apparently have not entirely lost the drive for cell-division, but they cannot complete it, and produce "Siamese-twin" animals. If some of these doubled forms are placed in clear water, a veritable frenzy of cell-division takes place, with animals, and even separated parts of animals, produced in all sizes and a wide variation in abnormal numbers of body parts.

Science News Letter, April 5, 1947

ENTOMOLOGY

Insects' Shell Tanned With Exposure to Air

➤ WHEN YOU are spading up your spring garden you are very apt to turn up numbers of brown beetles and other insects with their shells still unhardened. Leave them exposed to the air for a while, and their shells will take on the stiffness you expect in insect bodies.

Chemically, this process is very similar to the toughening that takes place when raw hide is tanned into leather; proteins are acted upon by an acid and made harder and more impervious. The chemical nature of the hardening of insects' outer shells has been discovered by three Cambridge University zoologists, Drs. M. G. M. Pryor, P. B. Russell and A. R. Todd, who report on their investigations in *Nature* (March 22). In the insects which they have analyzed, the hardening agent has proved to be a complex compound based on dihydroxybenzoic acid linked with either acetic or lactic acid.

Science News Letter, April 5, 1947

BOTANY

Flowers We Fail to See

Easter's symbolism of the triumph of life over death can be seen in the tiny flowers of trees if you look carefully. Most stem from high up.

By DR. FRANK THONE

See Front Cover

➤ EASTER has always been a feast of flowers. Flowers are emblematic of the triumph of life over death, which is the primary significance of the whole Easter observance. Laid on a tomb, they speak of hope. Heaped on the altar, they sing of triumph.

Strangely enough, though, the flowers we always use at Easter are for the most part earth-bound. Lovely as they are, lilies and narcissi and tulips do not stand far above the ground, and even such early-flowering shrubs as forsythia and lilac and spiraea rise but little higher. We seldom gather flowers from trees, unless they are low trees with branches easily seized from the ground, like hawthorn and cherry and crabapple. Flowers that aspire nearest to heaven, on tall trees, we seldom seek.

Some Large Flowers

Some full-sized trees have flowers large and conspicuous enough to make a showing even at neck-craning distance; the waxy blossoms of magnolias, for example, or the showy clusters of horse-chestnuts and catalpas.

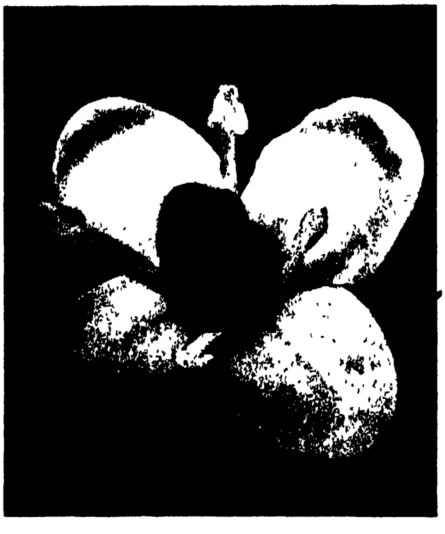
But the flowers of most large trees are not only borne high up, they are also so small and inconspicuous that few persons outside the professional ranks of botanists and foresters pay any attention to them. Their roster is a notable one: all the conifers, all oaks, hickories, maples, beeches, elms, poplars, willows, hackberries, walnuts, sycamores—in fact, almost all trees that figure importantly in the makeup of our native forests.

There is good cause for this, if you accept either the evolutionary doctrine that structures without survival value to the organism are themselves unlikely to survive, or its more simply-stated philosophical opposite number, that "everything has its use." Most of the trees in this list, and many others besides, are wind-pollinated. Needing no help from insects, their flowers lack the lures of bright petals, sweet odors and tempting nectar that attract insects to the kind of flowers that most of us think of as "really flowers."

Small But Beautiful

Small and inconspicuous though these usually unnoticed flowers are, they have beauties of their own, as all well-adapted, functional structures are likely to have. These hidden symmetries can be spied out with a good hand lens, or recorded permanently with a medium-power enlarging lens on a camera. Prof. Walter E. Rogers' "Tree Flowers," published a dozen years ago, is a classic of this kind of photography; more recently Dr. W. M. Harlow of the New York State College of Forestry has also done some notable work along this line.

Brought up to a scale that the human eye can perceive and appreciate, these tiny flower-parts can be great stimulants to the imagination. The styles on a chestnut's female or pistillate flower, shown on the cover of this Science News Letter, reach out like pale, supplicating fingers; willow seed-clusters, seen enlarged on the cover, group into a flame-like plume; an individual floret from the dogwood's flower-cluster looks like a miniature Greek vase in porcelain or carved ivory; twin sacs filled with pollen in almost any staminate flower are the gold-bags of a miser until they burst—then they are a spendthrift's pockets.



HOLLY FLOWER—If the flowers of this tree were as large as cherry blossoms, holly would be as highly esteemed for them as it is now for its berries. Pictures by Prof. Walter E. Rogers.

Not all these small but beautiful flowers belong to the group that lets the wind do their wooing. Some of them are fair copies of more conspicuous blossoms that depend on insect cooperation, with sepals and petals as well as the indispensable reproductive parts, the stamens and pistil.

Such a one, for example, is the holly flower. Enlarged to a more easily visible size, it becomes an even competitor with any cherry or apple blossom. It was appreciated as long ago as the sixteenth century, as witness two verses in the old Christmas carol:

> "The holly has a blossom
> As fair as the lily flower."

One interesting thing is brought out by a magnifying-glass examination of holly flowers: Although holly trees and bushes are separately either male or female, it was evidently not always so. For the female flower, that forms the berry, has four stamens as well as its pistil; but their anthers are withered and never produce any pollen. Similarly, the male flower, with its functional stamens, also has the nub of a pistil, which is of course barren.

Sweet Scent

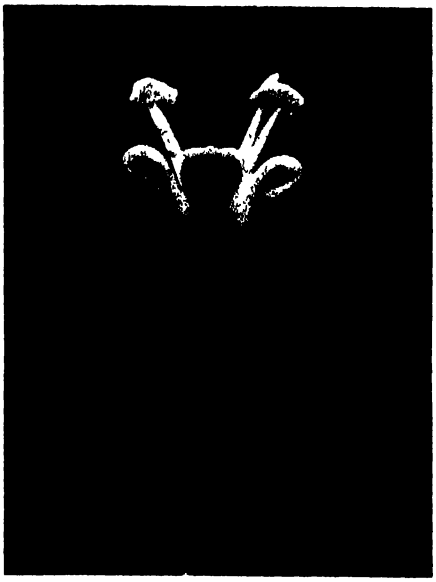
Some of these small flowers that nevertheless attract insects make up for their lack of conspicuousness with intensified odor. As late spring turns the corner toward full summer, go out to a linden tree, or to a flowering grapevine. Either of these, when in full bloom, will pour forth a flood of sweet scent that is intoxicating even to dull human nostrils. No wonder that the more scent-sensitive bees and small moths go as mad over them as a cat over a catnip ball!

While some of the small, wind-pollinated flowers, like those of willows, alders, elms and poplars, come in plenty of time for Easter, and even weeks before that, wind pollination is not necessarily an early-season phenomenon. Most oaks, for example, bloom in May, when there are plenty of insects around, and plenty of insect-pollinated flowers for them to work on. Many of the conifers, too, toss their clouds of yellow pollen to the breeze when it has been warmed up a bit.

It used to be thought that "imperfect" flowers, dependent upon the wind for pollination, were relatively primitive and "simple"—the marks of earliest-evolved seed-plants. There is no question that the earliest-evolved seed-plants were wind-pollinated—the insects that existed in those times were ill adapted to the job of carrying pollen. But to conclude from that fact generalization that all wind-pollinated plants are primitive is a case of reasoning backward: certain wind-pollinated families, such as grasses and sedges, are relatively highly evolved; and it is becoming apparent that some of the wind-pollinated trees, like oaks and hickories, merit consideration above the humble rank to which they were assigned by earlier botanists.

Although we may need the aid of a magnifying glass to see their tiny flowers, there is no need for magnification of the importance of wind-pollinated plants. To this group belong all grains, the beets and the cane that are the sources of almost all of our sugar, the palms that yield us nuts for oil and dates for food, such fiber plants as hemp and ramie, all softwoods and most hardwood trees, the grasses that form our pastures, lawns and golf courses, and most of the shade trees that line our streets and fill our parks. We may lavish our attention on the plants with showy flowers, but it is the ones without such adornment that really make human (and animal) life on this planet possible.

Science News Letter, April 5, 1947



DECEIVING DOGWOOD—Things are not what they seem: this is the real flower of the flowering dogwood.

MEDICINE

A-Bomb Story Not Yet Told

Four or five generations may pass before the full effects of A-bombs will be felt. Jap babies show no abnormalities traceable to radiation.

➤ EVERYONE ALIVE in the world when the atomic bombs fell on Hiroshima and Nagasaki may be dead before it is known definitely whether Jap babies are going to be born deformed or abnormal because of A-bomb damage to their parents' germ-cells.

The effects of such damage may not show up for several generations. At 20 years to the generation, it may be 100 years before abnormalities, if they do occur, will appear in descendants of the atomic bombing survivors, it is thought.

This is because the changes, or mutations, which irradiation can bring about in some species of life, such as fruit-flies, are in most cases recessive and may go undetected for several generations.

The fact that some deformed babies have been born in Japan since the A-bombings does not mean that the deformities or abnormalities were the result of the bombings. Members of the Atomic Bomb Casualty Commission, who have just completed a special study of the situation in Japan, found no more cases of such abnormalities than would be normally expected. In any population, it was pointed out, there are always a certain number of individuals born who are not fully normal.

Sterility of a temporary nature apparently occurred, the Commission found from autopsy studies made on those who died within a few weeks after the bombings. Whether any survivors will be permanently sterilized cannot be determined yet.

Starvation and infectious diseases are sterility factors which were present at the time of the bombings. If sterility does occur, it may be difficult or impossible to determine the part played by these factors and the part played by radiations from the bombs.

Members of the Commission were: Dr. Austin M. Brues of the University of Chicago and the Argonne National Laboratory; Dr. Paul S. Henshaw of the Clinton Laboratories, Oak Ridge, Tenn.; Lieuts. Melvin A. Block and James V. Neel (MC), U. S. Army, and Lieut. (j. g.) Frederick W. Ullrich (MC), USNR.

Concrete affords such a degree of protection that a person within a concrete building 500 meters (slightly under one-third of a mile) from the ground center of the explosion fared no worse, on the average, than a person standing in the open 1,400 meters distant from the blast.

A large number of burns suffered by the victims, the Commission found, healed with the accumulation of large amounts of elevated scar tissue, called keloids. Whether these are forerunners of cancer and why they occurred are unanswered questions.

Science News Letter, April 5, 1947

PHYSICS

Air Pressure Measures Roughness of Surfaces

➤ A NEW LABORATORY instrument called a rugosimeter, for measuring the roughness of surfaces, is offered by Dr. Melvin Mooney of the United States Rubber Company for patent 2,417,988. Air under pressure is blown through an opening in the middle of a smooth plate applied to the surface to be measured. The rougher it is, the more openings for air flow it will offer; hence a pressure gauge can be used to give an integrated reading of the surface's roughness.

Science News Letter, April 5, 1947

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Do You Know?

A new chemical compound to improve wear and waterproof *shoe soles* includes raw linseed oil, castor oil or cottonseed oil, varnolene (a petroleum derivative), pine tar and benzaldehyde.

One of the most acute *housing* shortages in the world is in Rio de Janeiro, Brazil; this Brazilian capital has increased a half-million in population in the past few years.

Two young bulls and two heifers of the *Red Sindhi* breed have been brought to America to start an experiment in developing better dairy cattle for southern climates.

The great gray marsupial *frog* of the Orinoco river country has an area beneath the skin of the lower back where eggs are deposited and hatched, and from which the developed young emerge through a temporary slit along the back.

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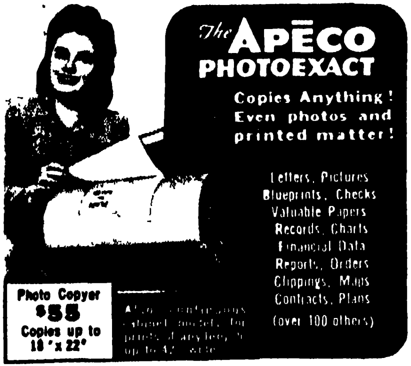

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MEDICINE

Aspirin Starts Blood Flow

➤ WHEN BLEEDING starts up two or three days after a tooth has been pulled, it probably is because the patient has been taking aspirin or some related drug to relieve pain.

Studies showing this are reported by Dr. Gustav William Rapp of the Chicago Dental College, Loyola University, in the *Journal of the American Dental Association* (April 1).

It should be possible to prevent the delayed bleeding, Dr. Rapp states, by giving proper doses of synthetic vitamin K, the so-called anti-bleeding vitamin.

Patients who have considerable bleeding after removal of tonsils probably owe this to the aspirin they have been taking to relieve the pain after the operation, Dr. Rapp points out, referring to a report by another scientist, Dr. Rudolph Singer of Vienna who joined the U. S. Army Medical Corps.

Dr. Singer made what Dr. Rapp calls "the remarkable observation" that the high frequency of hemorrhage after tonsil removal in America as contrasted to its infrequent occurrence in Europe is probably because American doctors prescribe acetylsalicylic acid (aspirin), alone or with other drugs, for relief of pain after the operation. European doctors almost always prescribe a different drug, aminopyrine (Pyramidon) for this purpose.

Salicylic acid, Dr. K. P. Link and associates at the University of Wisconsin have discovered, causes a deficiency of prothrombin in the blood. When there is too little prothrombin, the blood clots slowly. Bleeding is prolonged and the clot formed is fragile.

Vitamin K can overcome this because it stimulates production of prothrombin.

Following these clues, Dr. Rapp made some tests on 40 apparently normal students. He gave some of them tablets containing acetylsalicylic acid, acetophenetidin and caffeine, such as are prescribed by many dentists for relief of pain. He gave others the same tablets plus tablets of synthetic vitamin K. Just before this and every day for six days after, he tested their blood for prothrombin.

Those getting the acetylsalicylic acid mixture developed an acute deficiency of prothrombin in their blood. This showed up within one and one-half to two days after taking the tablets. It lasted for longer than five days. The clotting time in these students was nearly double the normal.

The prothrombin deficiency could be prevented by taking synthetic vitamin K with each tablet of the acetylsalicylic acid mixture.

Science News Letter, April 5, 1947

GENERAL SCIENCE

Science Foundation Bill Takes Step in Congress

➤ A NATIONAL science foundation bill has been reported out of the Senate labor-public welfare committee and has gone on the calendar.

This may be the first step to federal financing in peace of basic research such as paid dividends during the war. Last year a science foundation bill passed the Senate and died in House committee.

The Senate bill is a modification of S. 526 introduced by Sen. H. Alexander Smith, R., N. J., and contains some features of the rival bill authored by Sen. Elbert Thomas, D., Utah.

The bill reported would create a foundation of 24 scientists serving on a part-time basis.

The House committee considering similar science foundation bills has not yet reported, since testimony at hearings extending over two days has not yet been printed. The Senate committee did not hold hearings.

A survey by the Inter-Society Committee for the science foundation, representing 75 scientific organizations, shows that two-thirds of the representatives in that committee favor a full-time administrator rather than a part-time board in control of the foundation. This is the organization proposed in last year's bill and in the Thomas bill.

But the scientists are willing, if necessary, to accept a commission form of administration, which is alternate choice of 95%, or a board, which is alternate choice of 86%.

Allowing the foundation to include the social sciences, which the reported bill is expected to do, met with 99% approval.

Patent legislation should not be included in the bill in the opinion of 94% of the scientists, and 86% are in favor of the foundation granting undergraduate scholarships.

Science News Letter, April 5, 1947

ARBORICULTURE

Seventy-Five Arbor Days

By setting out young trees, children will celebrate Arbor Day, 75 years old on April 10 this year. It was started by Julius Sterling Morton.

➤ ARBOR DAY, observed annually by thousands of school children who set out young trees to grow up with themselves, will see its seventy-fifth anniversary on April 10 of this year. On Jan. 4, 1872, the Nebraska state legislature, spurred by tree-loving Julius Sterling Morton, set aside April 10 as the first Arbor Day, offering prizes for the largest number of trees properly planted on that day.

In 1885, the Nebraska legislature changed Arbor Day to fall on Mr. Morton's birthday, April 22. Dates of observance in other states necessarily vary according to the planting season, being as a rule earlier in the South than in the North. The Arbor Day idea has spread outside the United States, and has taken hold in countries as far apart as New Zealand and Spain.

Sterling Morton, as he was usually called, was born in New York and educated in Michigan, but migrated to the then new Territory of Nebraska in 1854, when he was 22 years old. The poverty of the prairie country in trees, and the resulting inconveniences suffered by the settlers, impressed him greatly, and with all the enthusiasm of youth he began his crusade for growing crops of trees.

He led the way by personal example, planting in the new-turned prairie soil every kind of tree seedling and cutting he could get. He used a small newspaper which he owned as a pulpit to spread his gospel. He insisted on proper planting and year-round care. When he was called to Washington in 1893 as Secretary of Agriculture in President Cleveland's cabinet, he continued to agitate for tree planting in the East as he had in the West.

Arbor Day has been made so largely a school celebration primarily to impress upon the new generations of citizens the need for more trees and more knowledge about trees. However, since the actual plantings made by pupils in school can hardly be more than tokens, the real responsibility for large-scale plantings that will really restore some measure of America's once great wealth in trees must continue to rest with owners of lands capable of producing mass timber crops.

Science News Letter, April 5, 1947

GEODESY

Tube Measures Levels

➤ NEW INFORMATION about the Gulf Stream could be obtained if a slender tube filled with water were laid like a submarine cable under the narrowest part of the Straits of Florida, through which pours the current that eventually becomes the famous "river of the sea". This suggestion is made by Dr. R. B. Montgomery of the Woods Hole Oceanographic Institution in *Nature* (March 22).

Such a water-filled tube, less than a half-inch in diameter, has already been used in Denmark for measuring the comparative heights of points on land on opposite sides of a strait. The method was originated by Dr. N. E. Norlund of the Danish Geodetic Institute at Copenhagen.

The operation of this device depends on the principle known as the hydrostatic balance, taught in every high-school physics course. Essentially, this principle is that the level of a liquid in two arms of a U-shaped tube is always the same, no matter how far apart they are. Of course, when the ends are miles apart, measurements have to be corrected for differences in temperature and barometric pressure when really precise levels are to be determined.

What would be demonstrated by the use of a Norlund tube under the Straits of Florida is the degree of piling-up on shore of water pushed through in the swift current, Dr. Montgomery states.

The Norlund tube is particularly useful in determining true heights of points on land above sea level. There is a great deal of difference between the theoretical mean sea level and what an observer actually sees if he takes his instruments down to the shore and tries to make measurements. Currents, tides, winds and other factors always make differences in water level at different points along any shoreline, and these are apt to be especially marked along the opposite shores of channels. So it is simpler to shut a column of water away from these disturbances by isolating it in a tube and thus establishing a true hydrostatic balance.

Science News Letter, April 5, 1947

Atoms, Planets & Stars

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ENTOMOLOGY

NATURE RAMBLINGS

by Frank Thone

Psyche

➤ AT EASTERTIDE we memorialize Christendom's ancient faith in "resurrection, and life everlasting" with such symbols as eggs and little chicks, flowers that spring from seeming-dead bulbs, and rabbits that leap forth out of the dark earth.

Strangely enough, however, one of the oldest of Christian immortality-symbols has long been neglected: the butterfly, that breaks the winding-sheet of the cocoon and glories in the new sun. The symbolism is older than Christianity, as a matter of fact: to the Greeks, who also believed in immortality, the word Psyche meant both "soul" and "butterfly." It is quite likely that the butterfly-symbols found here and there in early Christian art were brought in by Greek converts who had heard the sermons, or read the letters, of St. Paul.

Butterflies should be a really good symbol of our concept of the spirit. They are beautiful, they almost seem to float through the air rather than fly, when they do condescend to alight it is usually on a flower, and when they feed it is upon nectar. True, Easter is usually too early in spring for many butterflies to be out and about; but at least we could have their painted or printed images added to the usual floral decorations.

Science News Letter, April 5, 1947

MICROMAX "Watches" ASTM Tests In Dewey and Almy Lab

The above Micromax Recorder, shown being examined by a test engineer of the Dewey and Almy Chemical Co., is doing an important job as the measuring and controlling instrument in tests of the diverse cement ingredients the company manufactures.

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AERONAUTICS

Aircraft Noise Reduced By Changing Approaches

➤ PROGRESS is reported in the elimination of the noise nuisance of low-flying planes in the neighborhood of airports.

Noiseless planes have not yet been developed although abatement of noise is promised, with new types of propellers under test and with mufflers on aircraft engines.

The present progress comes from government activities to control flying altitudes and approach lanes used by pilots in airport vicinities. The U. S. Civil Aeronautics Administration reports that it finds that much of the annoyance to persons on the ground is eliminated by changing the "traffic pattern" around airports, "and by pilot cooperation in using suitable power and propeller-pitch settings."

Civil air regulations forbid flying below 1,000 feet over congested areas "except when necessary for taking off and landing." Most of the nuisance noise, however, occurs during landings and take-offs from fields close to residential areas. In many cases, the nuisance is lessened by using approach airlanes over water, industrial sections and wastelands. Where this has been done, complaints have been eliminated. Most pilots and airport operators, CAA states, have cooperated wholeheartedly in its program.

Airplane noise comes from two sources, the propellers and the engine exhaust. Propeller noise dominates engine exhaust noise even though the exhaust has a relatively high intensity. To reduce the total noise, it will be necessary to modify the propeller to operate at low tip speeds, and to have a large number of blades, the National Advisory Committee for Aeronautics has determined. An effective engine muffler will also be required

Science News Letter, April 5, 1947

CHEMICAL ENGINEERING

Iron-Smelting Process Uses Heated Oil Fuel

➤ IRON is extracted from ores of high oxygen content, like limonite and magnetite, by a process using oil heated to the cracking-point as part of its fuel, on which U. S. patent 2,417,949 has been granted to Elfego Riveroll of Hermosa Beach, Calif.

Reduction of the ore is carried out in three steps. First the ground-up ore is fed through a chamber where it meets high-temperature flame that drives out all water present and loosens up its texture. Then it passes to a second chamber where it is mixed with oil heated to the cracking-point; the released carbon and hydrogen atoms seize upon part of the ore's oxygen, thus beginning the reduction process. Finally, in a third chamber that is really an electric furnace from which all oxygen has been excluded, it is further heated in the presence of coke or other form of solid carbon, which completes the reduction.

Science News Letter, April 5, 1947

MEDICINE

X-Rays and Colchicine Together Affect Cells

➤ X-RAYS and colchicine used together can have effects on growing cells that neither the rays nor the drug produces alone, Dr. A. Back of the Cancer Laboratories of the Hebrew University in Jerusalem has discovered. He announces his findings in *Growth.*

In his experiments, Dr. Back sprouted one lot of onion seed in water containing one-quarter of one per cent of colchicine, and another lot in plain distilled water. After the initial root had started to grow, both lots were given an X-ray exposure of 2,000 roentgens. Growth of the untreated roots was checked little or not at all by the X-rays, whereas there was notable inhibition of the colchicine-treated roots.

Science News Letter, April 5, 1947

Books of the Week •

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AUDIO-VISUAL AIDS IN THE ARMED SERVICES—John R. Miles and Charles R. Spain *Am. Council on Education*, 96 p., illus, paper, $1.25. Wartime necessity taught many through the use of visual, auditory, and tactile aids; this report of the Commission on Implications of the Armed Services Education Program explores these lessons with a view to their place in peacetime education.

CARNEGIE INSTITUTION OF WASHINGTON, YEARBOOK no. 45· July 1, 1945-June 30, 1946—*Carnegie Inst.*, 235 p., tables, paper, $1; cloth, $1.50.

FIRST PENTHOUSE DWELLERS OF AMERICA —Ruth Underhill—*Southwestern Monuments Assn.*, 160 p., illus., $4.25. Long out of print, this revised edition tells the story of the Pueblo Indians, their life, customs, and history It is a handsome book with thoughtfully chosen photographs.

FIRST YEAR QUALITATIVE ANALYSIS—Carl J. Likes and Aubrey E. Harvey—*Crowell*, 134 p., a textbook written for colleges where qualitative analysis is included as the latter part of a first-year general chemistry course.

FOUNDATIONS OF DEMOCRACY—F. Ernest Johnson, ed.—*Inst. for Religious and Social Studies*, 278 p., $2. An analysis of the historical, philosophical and religious sources of democracy.

FUNDAMENTALS OF PLASTICS—H. M. Richardson and J. Watson Wilson, eds.—*McGraw-Hill*, 483 p., illus., $5. This survey for students includes four sections· relationship of chemical structure to physical properties, the six classes of plastics, commercial manufacture, and an evaluation of testing methods.

A HANDBOOK OF COMMONLY USED DRUGS —Michael Pijoan and Clark H. Yaeger—*Thomas*, 182 p., $3.75. A small compact book for use where standard texts on pharmacology are unavailable, it deals with drugs, their usage, preparation and techniques and is the result of experience in field expeditions.

HUMAN GENETICS—Reginald Ruggles Gates —*Macmillan*, 2 vols, illus., $15. Using embryology, morphology, physiology, biochemistry and anthropology, this comprehensive work explains the development and inheritance of both normal and abnormal conditions.

INSECTS OF GUAM—II—Bernice P. Bishop Museum Bulletin 189—*Bishop Museum*, 237 p. illus., paper, $2.50. The discussions include about 470 species of which 94 are described as new; the material is mainly from collections made in Guam by D. T. Fullaway and O. H. Swezey and Usinger.

MESON THEORY OF NUCLEAR FORCES—Wolfgang Pauli—*Interscience*, 80 p., $2. A collection of the author's lectures at M. I. T. serve to give students and research workers an introduction to the theory of the interaction of mesons with protons and neutrons (nucleons) and the interactions between nucleons derived from it.

MUSICAL ACOUSTICS—Charles A. Culver—*Blakiston*, 2nd ed, 215 p., illus., $3. A textbook for music students applying fundamental laws of acoustics to this field.

THE POETRY OF MATHEMATICS AND OTHER ESSAYS—David Eugene Smith—*Scripta Mathematica*, 90 p, $1.25 These articles, while not in themselves mathematical, relate to lines of interest which mathematics suggests.

RADIO-CRAFT LIBRARY, Nos. 29, 30, 32, 33, 36, 37, 38—Editors of Radiocraft—*Radcraft Publ.*, 64 p., illus, paper, each 50 cents. Titles Handy Kinks and Short Cuts, Unusual Patented Circuits 1944-1946, Advanced Service Technique, Amplifier Builder's Guide, Radio Test Instruments, Elementary Radio Servicing, How to Build Radio Receivers.

RAW MATERIALS FROM THE SEA—E. F. Armstrong and L. M. Miall—*Chemical Pub.*, 196 p, illus., $3 75 The chemical problems represented by the oceans are discussed, the substances present in them in minor quantities, and their winning from the sea.

TEN GREAT INVENTIONS, *National Machine Tool Builders' Assn*, 30 p., illus., paper, free. Ten historical inventions are described which were introduced shortly after the invention of basic machine tools.

THE TREATY OF VERSAILLES AND AFTER: Annotations of the Text of the Treaty—U. S. Dept. of State—*Govt. Printing Office*. State Dept. Publ. No. 2724, 117 p., $3.25 This historical document was prepared for the delegates to the Foreign Ministers Conference in Moscow; it should clarify the treaty.

UNITY AND DIFFERENCE IN AMERICAN LIFE—R. M. MacIver—*Inst. for Religious and Social Studies*, 167 p., $2. Three sections cover the common ground, the dividing issues, and what we can do about them.

THE WALLACES OF IOWA—Russell Lord—*Houghton*, 615 p., illus., $5. The three generations of Wallaces, covering a century of history and growth of America, are portrayed here.

THE WORLD AT THE CROSSROADS—A. Blaine, E. H. Cassels, E. R. Embree, W. W. Waymack, Q. Wright—*World Citizens Assn.*, 160 p., paper, 25 cents. The executive committee of this organization states the present situation of the world with respect to peace, urges all to accept and support the United Nations, and states the aims of the World Citizens Association.

Science News Letter, April 5, 1947

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PHYSICS

System Promises to Make All Ports Free of Ice

➤ RUSSIA'S ENDLESS quest for an ice-free port may have been solved, without need for territorial expansion, by a Swedish invention on which U. S. patent 2,417,519 has been issued. If it works out as described, it would make ice-free ports of Leningrad or Vladivostok or any harbor on any wintry coast.

The invention is the work of Bengt O. E. Persson of Enebyberg and Erik Forslind of Stockholm. It consists simply of long lines of perforated pipes laid under the channel to be kept ice-free. Air is pumped through the pipes. As the bubbles rise in streams from the perforations they pull currents of water upward along with them. This water, which is above thawing temperature, displaces the thin stratum of cold water immediately under the ice, and proceeds to melt a clear channel. If used early enough in the winter, it can prevent the initial formation of ice, the inventors claim.

Science News Letter, April 5, 1947

Water in which houseplant *cuttings* are rooted should be changed frequently so that oxygen will be available for the rooting.

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❂ *TRANSPARENT plastics have entered new fields. One type is used to make 300-gallon olive brine vats; another to make storage tanks for a chlorine bleaching solution. They are free from reactions with the chemicals used, and the contents can be seen continually.*

Science News Letter, April 5, 1947

❂ *AIRPLANE reading lamp is a peacetime version of the wartime gunsight lamp. Inserted over the passenger's head, the new 20-watt lamp provides almost 10 times the illumination of lamps of the same wattage previously used.*

Science News Letter, April 5, 1947

❂ *CORN CUTTER, a household device to remove green corn from the cob, has a saddle base hollowed to fit over the ear, and a raised handle for pushing it forward. A cutting edge is set at a proper depth below an opening in the center of the base.*

Science News Letter, April 5, 1947

❂ *GARDEN HOE, recently patented, has a spring loop in the lower part of its handle that absorbs shocks, strains and vibrations in use.*

Science News Letter, April 5, 1947

❂ *IMPROVED abacus, with braille column-indicators on the frame for use by the blind, is a simplified type for busy executives to use in adding, subtracting, multiplying and dividing. The fifth and sixth digit disks on each rod, as shown in the picture, are larger than others to speed operation and particularly to assist the blind.*

Science News Letter, April 5, 1947

❂ *BABY WALKER recently patented, can be used for a go-cart, rolled on its four casters. The metal framework that holds the child carries a suspended seat with leg holes for walking. The insertion of a foot board and handles converts it into a go-cart.*

Science News Letter, April 5, 1947

❂ *THICKNESS GAGE, to measure electrically from the outside the thickness of iron and steel pipe from one-quarter to two inches in diameter, includes an indicating instrument, a gage head, and a saddle connected to the gage head by two screws. Different saddles, which must fit the pipe, are required for each diameter.*

Science News Letter, April 5, 1947

❂ *WIRE STRIPPER, for removing cotton, silk, plastic or rubber insulation from electric wires by a continuous process, makes use of two electrically heated stripping blades. Fumes and smoke created in the process are drawn away by a built-in exhaust, and strippings fall into a water compartment.*

Science News Letter, April 5, 1947

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Question Box

AERONAUTICS

How is aircraft noise being reduced? p. 222.

BOTANY

What is the appearance of the dogwood's real flower? p. 218.

When and where was Arbor Day started? p. 221.

CHEMISTRY

From what will nylons be made in the future? p. 215.

DENTISTRY

What research leads to the prediction of tooth banks in the future? p. 214.

ENTOMOLOGY

Why should butterflies be symbols of Easter? p. 222.

MEDICINE

Is cancer primarily a woman's disease? p. 216.

What is thought to be a cause of cancer? p. 211.

Why will it take several generations to tell the total effect of the atomic bomb on the Japanese? p. 219.

PHOTOGRAPHY

What is the highest distance from which a photograph has ever been taken? p. 218.

PSYCHIATRY

Why are people left-handed? p. 212.

PHYSICS

How can air eddies be prevented in wind tunnels? p. 212.

Where published sources are used they are cited.

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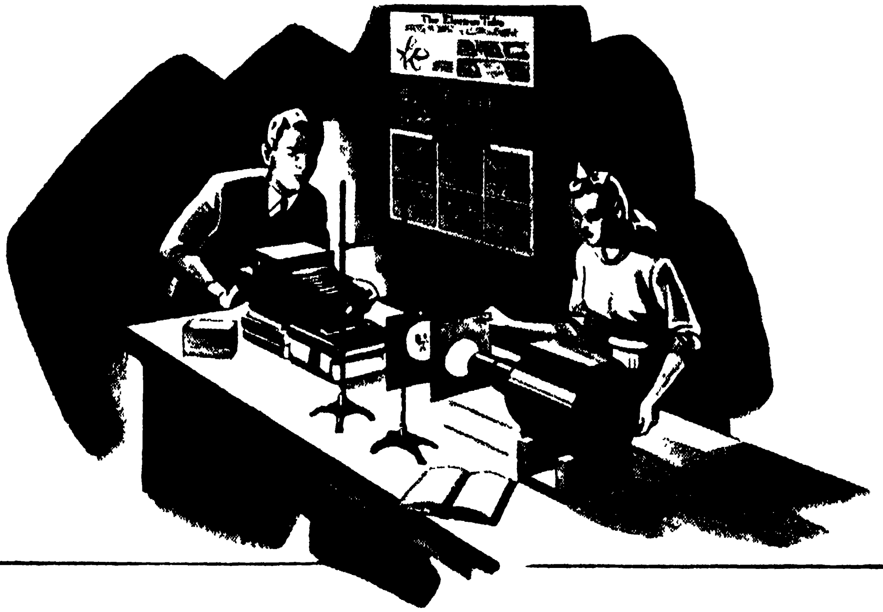

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1 JUL 1947

NUTRITION

Carrots Give Longer Life

Vitamin A in large doses increased life span of rats by over 10% and may possibly do the same for humans. Extra decade comes in prime of life.

➤ GET ON the carrot wagon if you want to add an extra 10 years to your life at its prime.

This advice seems justified on the basis of latest nutrition studies by Dr. Henry C. Sherman of Columbia University. Rats given four times the normal amount of vitamin A in their diet lived more than 10% longer than their life expectancy. And carrots are a very rich food source of vitamin A for humans.

The increased length of life comes at the prime of life in the rats and would in humans, too, Dr. Sherman thinks. The rats with the extra vitamin A grow more rapidly and more uniformly and have more vigorous offspring.

Vitality is higher and death rates lower at all ages. Full adult capacity, or the prime of life, is reached earlier and kept longer. Life expectation is increased not only for the young but also for grown-ups.

"The previous general progress of public health had increased the life expectation of the infant but not of the grown person," Dr. Sherman points out. "Now the nutritional improvement of the norm raises the life expectation of the adult as well.

"The extra years thus offered are not to be pictured as added to old age. Rather it appears that something like an extra decade can be inserted at the prime or apex of the life lived in accordance with today's newer knowledge of nutrition. Life becomes longer because it is lived on a higher health level throughout. The apex of attainment is higher, the period of prime is longer and, in human terms, there is a smaller percentage of years of dependence."

The basic diet to which Dr. Sherman added extra vitamin A and got longer-lived rats had the same relation between amounts of vitamin A and calories as that recommended as a good diet for humans in 1941. So if you are going to add a decade to your prime, you will eat four times the recommended amounts of carrots and other yellow vegetables and fruits and green, leafy vegetables and liver.

Dr. Sherman, whose studies are supported by grants from the Nutrition Foundation, the Markle Foundation and Swift and Company, is now trying to learn what further benefits can be achieved by increased amounts of calcium in the diet and by improving the relation of meat and other protein foods to phosphorus and the B vitamin, riboflavin.

Science News Letter, April 19, 1947

ASTRONOMY

World's Largest Telescope To Bring Universe Closer

See Front Cover

➤ THE 200-INCH telescope on Mount Palomar in California, the largest telescope in the world, will begin sweeping the skies before the end of 1947.

The grinding of the lens, delayed more than four years by the war, is now essentially completed. The supporting structure is ready. This summer the telescope will be assembled and the whole equipment put into operattion by the end of the year, reports Raymond B. Fosdick, president of The Rockefeller Foundation.

Funds for the erection of the giant telescope have been supplied by three Rockefeller boards. A total of $6,250,000 has been appropriated to the California Institute of Technology for this unique instrument of scientific research.

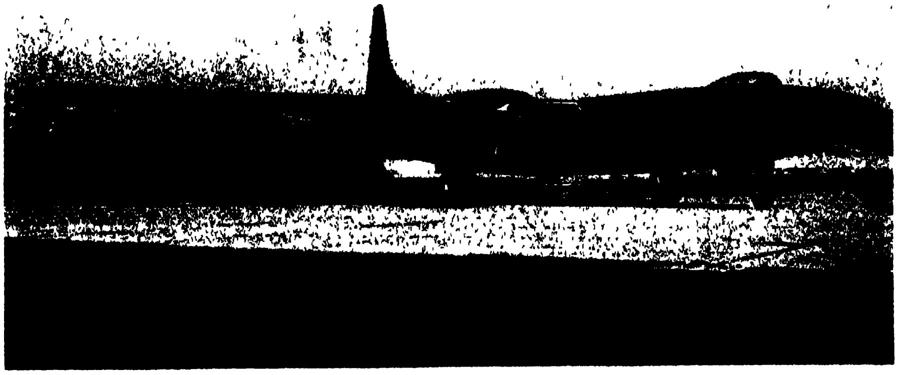
First planned about three decades ago, a number of years elapsed before successful solutions were found for the problems of casting so large a block of suitable glass, of grinding and polishing it to a precise curvature within a few millionths of an inch, and of supporting the huge mass of 530 tons so that the telescope could be moved almost without friction to follow the pinpoint of a star across the skies.

"The new telescope will project man's sight into the universe two times farther than it has ever gone before—to a distance more than a thousand million light-years away," stated Mr. Fosdick in explaining why this huge expenditure of money and effort is justified. "It will open up an unexplored sphere eight times the volume of that which has hitherto been sounded.

"What lies beyond the limits of our present knowledge?" he questioned. "Do the stellar systems extend on indefinitely, or is a boundary finally reached beyond which there are fewer and fewer nebulae? What is the true interpretation of the immense velocity with which all the stellar systems appear to be receding?

"Since stars and nebulae are vast aggregations of atoms or atomic fragments, reacting on each other under conditions of pressure and temperature beyond anything that can be duplicated in man's laboratories, what secrets can we learn that will add to our knowledge of fundamental physics?"

Science News Letter, April 19, 1947



NEWEST JET—The Army Air Forces' XB-46 recently completed its first test flight. Powered by four jet engines, it is 106 feet long and 113 feet across

MEDICINE

Dye for Radiation Sickness

A blue dye may save lives in case of another atomic bombing because it helps blood clotting in the illness following exposure.

➤ A BLUE DYE may save many thousands of lives in the event of any future atom bombing. It is called toluidine blue. Its potential value was discovered by Drs. J. Garrott Allen and L. O. Jacobson, of the University of Chicago, in studies made under contract with the Manhattan Project.

The dye might save those survivors of an atomic bomb attack who were having the bleeding stage of radiation sickness. A considerable number of Hiroshima and Nagasaki survivors succumbed a few weeks after the bombings from the infection promoted by this internal bleeding. Even without the blue dye they might have been saved, American doctors think, if they had gotten blood transfusions and penicillin.

Patients with acute leukemia and certain other blood disorders may also get significant temporary benefit from the dye so far as the bleeding in such illnesses is concerned, the Chicago doctors report in *Science* (April 11).

The cause of the bleeding that comes in persons exposed to near fatal doses of ionizing radiations such as those from the atom bomb is an excessive amount of heparin in the blood, the Chicago doctors find. Heparin is an anti-blood clotting substance normally present in the liver. It is used medically to counteract a tendency to dangerous blood clots. Too much of it makes the blood clot very slowly or not at all. Fatal bleeding might result.

A dog suffering from radiation sickness like that seen in the Japanese after Hiroshima and Nagasaki had blood that took more than 48 hours to form a clot when a bit of it was tested in a glass tube. The clotting time returned to normal within 20 minutes after the blue dye was injected into its veins.

Neither vitamin K, the anti-bleeding vitamin, vitamin C, calcium salts nor blood transfusions prevented hemorrhage or stopped it in the irradiated dog. But the dye controlled the bleeding.

Science News Letter, April 19, 1947

PHYSICS

Long-Distance Dialing

➤ STRIKES of long distance operators won't be effective sometime in the future because of two developments that are still experimental:

1. Dialing of long distance calls directly from your telephone.
2. A machine that automatically times and prices the call you are making and makes out a bill for it.

In one part of Philadelphia, the first long distance dialing is being used, but so far it is the operators who do the actual dialing.

The gadget that sees to it—mechanically—that you pay for the call is in experimental use in a Los Angeles suburb. It is called "automatic ticketing." When the Los Angeles subscriber dials a toll call to a nearby community, the equipment automatically prepares a printed ticket with all the information needed for properly charging the call.

These developments were made during the war and first put into operation in 1943. The Bell System, which owns four-fifths of America's telephones, plans to expand these installations to other communities to provide an automatic long distance network, but an estimated 40% of the Bell System's subscribers still requires operators for local calls.

A combination of the Philadelphia long distance dialing system and the Los Angeles billing device may lead to future long distance calls made as easily as a call is dialed on a city phone today.

Another telephony development which may speed some types of future calls was first demonstrated in 1945. It is a radiotelephone circuit permitting 24 two-way calls to be transmitted on a single radio-frequency carrier wave.

Developed by the Federal Telephone and Radio Laboratories, the system uses the pulsetime modulation principle. A single transmitter and receiver and one radio-frequency carrier wave were used in making 24 calls at the same time.

Basically, the system uses an electronic selection system which allots certain fractions of each second for each of the 24 calls.

Science News Letter, April 19, 1947

BACTERIOLOGY

Britons Isolate Antibiotic From Penicillin Relative

➤ TWO BRITONS, John H. Birkinshaw of Pinner and Stephen E. Michael of Croyden, have isolated a new antibiotic drug from *Penicillium patulum* and *P. expansum*, two molds related to the species from which penicillin is obtained. U. S. patent 2,417,584 has been issued to them on their product.

Science News Letter, April 19, 1947

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PSYCHOLOGY

Murderers by Hypnotism

People can be hypnotized against their wills, believes psychologist. Even murder is possible from a peaceful citizen in a trance.

➤ SOME PEOPLE when hypnotized might be made to commit murder. This is the daring suggestion of a psychologist who believes some sufficiently suggestible people can be hypnotized against their will.

An Army private in a trance tried to strangle a lieutenant colonel in one of the experiments conducted by Dr. John G. Watkins of Welch Convalescent Hospital at Daytona Beach, Fla.

Reporting his findings in the *Journal of Abnormal and Social Psychology* (April). Dr. Watkins explained that the private was a "conscientious young man" with a good military record.

"In a minute you will slowly open your eyes," the private was told after he was hypnotized.

"In front of you, you will see a dirty Jap soldier. He has a bayonet, and is going to kill you unless you kill him first. You will have to strangle him with your bare hands."

The "dirty Jap soldier" in front of the subject was a lieutenant colonel, head psychiatrist and director of the neuropsychiatric division of the hospital.

After the private opened his eyes, he began to creep forward.

"Suddenly in a flying tacle he dove at the lieutenant colonel, knocking him against the wall, and with both of his hands began strangling the man," reported Dr. Watkins.

Guards pulled the private away, and the officer declared that the hypnotized subject's grip had been "strong and dangerous."

Pointing out that the private did not violate his own conscience, because he thought he was attacking an enemy, Dr. Watkins said the private "was acting under an induced hallucination."

If guards had not intervened and if a court martial had been convinced that people cannot be made to commit crimes under a hypnotic trance, the soldier might have been convicted of murder, declared the psychologist.

An Army lieutenant, given the same test in a trance, pulled a knife he was not known to have and almost stabbed an officer friend. The friend, who played the role of the Jap soldier in the experiment, was saved by witnesses who held back the hypnotized officer.

In other trance tests, Dr. Watkins forced hypnotized soldiers to divulge military information.

A corporal, described as "highly hypnotizable," was offered a $10 bill if he could keep from entering a trance. He fell in a deep trance staring at the bill.

"The controls," Dr. Watkins explained, "were certainly not as rigid as one would desire to establish firmly that criminal compulsions are possible, yet the combined weight of the evidence from these studies definitely favors that contention."

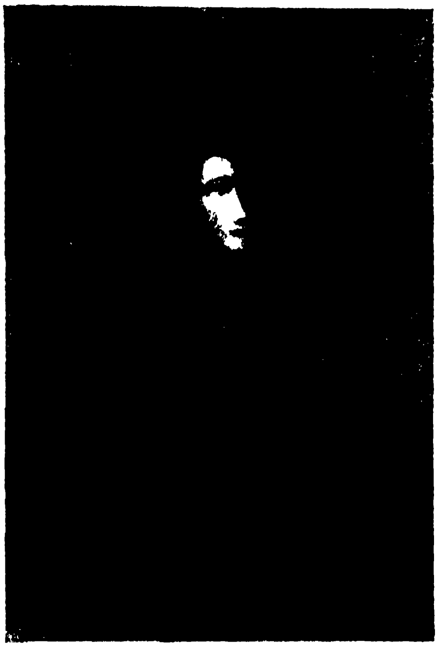
He added that the subjects chosen for the experiments were highly hypnotizable, but warned:

"There apparently would be many thousands of individuals like them in the total population."

Science News Letter, April 19, 1947

TEXTILES

Color of Chicken Feathers Determines Shade of Wigs



"LITTLE RHODA"—The silky fibers composing the wig of this model, named by the U. S. Department of Agriculture, were made from the feathers of a Rhode Island Red chicken and have the natural color of the feathers.

➤ BEAUTIFUL blonde, brunette and red-head wigs for show-window manikins have been made experimentally from chicken feathers without dyeing the fibers. The natural color of the feathers determines the exact shade of the finished wig.

Not the fluffy feather tips, but keratin in the quills, is used in making the silky fiber. The feathery barbs are first stripped off, then the quills are treated with an alkaline salt of an alkybenzene sulfonate The solution is then passed through a fine-holed nozzle into a coagulating bath, where the individual fibers harden.

The process for making the fiber from chicken feather protein was developed at the U. S. Bureau of Agricultural and Industrial Chemistry's Western Regional Laboratory at Albany, Calif. This fundamental research is being conducted in an attempt to find a profitable use for some of the keratin material found in approximately 175,000,000 pounds of chicken feathers that are usually wasted each year.

Chief obstacle in the way of using these fibers for textiles is that they absorb water and are much weaker when wet. But continued improvement in the wet strength of fibers from feather keratin is predicted through use of fundamental studies of the molecular structure, and chemical and physical properties of keratin. When a fiber having sufficient wet strength is developed, it is expected to have many uses.

Science News Letter, April 19, 1947

FOOD CHEMISTRY

Vinegar-Pickling Method Of Preserving Is Refined

➤ A REFINEMENT of the time-honored method of preserving meat by pickling it in vinegar is the basis of patent 2,417,806, issued to Hans F. Bauer and Elmer F. Glabe of Chicago, assignors to Stein, Hall and Company, Inc. They use an acetic acid salt.

Another refinement of the vinegar-pickling method is the subject of patent 2,417,889, granted to M. J. Stammelman of New York. He makes a food container with porous walls, which he impregnates with vinegar. The acetic acid vapor, slowly given off, prevents the development of spoilage molds and bacteria.

Science News Letter, April 19, 1947

NAVIGATION

U.S. Subs Out of Date

German snorkel and speed have made our U-boats obsolete except in their strength of build and the superior craftsmanship of the U. S. Navy.

By VICE ADMIRAL CHARLES A. LOCKWOOD

Inspector-General of the Navy

In a radio talk on "Adventures in Science" given over the Columbia Broadcasting System.

➤ THE NAVY has been celebrating an anniversary. Just 47 years ago the first submarine was accepted by the Navy. It was the *USS Holland*, named after the American inventor who built this submersible torpedo boat, as it was then called.

It was the great-grand-daddy of the modern fleet type submarine which is 310 feet long, displaces 1,700 tons, and is propelled by four powerful diesels totaling 6,400 horsepower.

This fleet-type submarine was the type of craft that destroyed a large number of Japanese vessels, both merchant and navy.

Our fleet-type submarines numbered only 39 at the beginning of the war. Records prove our submarines were the longest-range and most consistently effective weapon against the economy of maritime Japan.

Bikini Test Results

The United States submarines which were submitted to the power of the two atomic bombs at Bikini last summer came out remarkably well. At the risk of over-simplification, it can be said that of all vessels tested during Operation CROSSROADS the submarines were consistently least affected and displayed the greatest potential resistance to the ravages of a "fission" bomb. This is not to imply in any way that had either of the bombs directly struck any of the target submarines, they would not have been completely destroyed.

A submarine has a relatively small above-water structure and a tough, tubular hull designed to withstand the shock of depth-charging. However, the unfortunate part about this splendid vessel is that it is becoming obsolete!

Two things have made the American submarine of World War II behind the times. By late 1944 the superiority of our own anti-submarine measures against the German U-boats in the battle of the Atlantic was sufficient also to render United States submarines relatively ineffective against such counter measures. Fortunately, the Japanese were less skilled in combating American submarines and the advance of Allied surface and air forces was such that U. S. undersea craft had just about worked themselves out of business. The Navy did not wish to develop and build an advanced type of American submarine when it had no prospect of being employed at the time.

German Developments

The Germans were faced with extinction unless something could be done to turn the tide of battle in the Atlantic. They summoned their best scientists and engineers in desperation with orders to overcome the superiority which Allied anti-submarine measures had over them. When the war in Europe was over, our scientific investigating teams made astounding discoveries. They found something which, had it been put into operation, might well have prolonged the whole European phase of the war.

The Germans had been mass-producing a new type of submarine which had the snorkel, the breathing tube that could be raised and lowered like a periscope to provide air for the ship's diesel engines and the crew. In addition to the snorkel, the German subs had a radically streamlined hull to take full advantage of the increased battery capacity, both resulting in higher speed submerged.

The snorkel had already appeared on the standard German submarines. This allowed them to remain submerged the entire time they were away from their own ports. It made the already tough job of locating them submerged even more difficult, and they were never any longer caught on the surface. In the newer German types the streamlining and higher battery capacity resulting in an increased submerged speed, although of limited duration, would have definitely added to the difficulties of our searching anti-submarine craft. Submarines thus equipped could not only catch up to fast convoys and deliver their torpedoes, but they could get farther away in shorter time following the attack, making the area to be searched much larger.

The day of the submersible or the surface craft that could dive is past. The true submarine, or the vessel that can remain submerged indefinitely, has made its appearance, although it must still get its air from the surface. Not only that, it is a vessel of greatly improved tactical characteristics in a field where such developments will contribute enormously to chances for survival of such a craft following an attack.

Germans Too Late

The German understanding of the importance of seapower was really the thing that was too late. Actually the advanced craft could have been in operation well before the end of the war. About 80 of them were completely built in 1944; but the Germans had suddenly resorted to hydraulics in an effort to avoid the use of electric motors. Hydraulic installations are tricky and require a lot of "know how". The Germans didn't have it and saved the Allies a lot of headaches as a result. They were still trying to overcome hydraulic deficiencies when the war terminated.

These German submarines, submerged, could make about 15 knots compared to nine knots for our fleet type vessels. Allied investigators found German blueprints for a submarine which was to have even greater submerged speed.

The House of Representatives recently passed a bill allocating $30,000,000 for the construction of two new experimental submarines. That bill is now in the Senate and, if passed, will be one of the more obvious steps the Navy is taking to maintain submarine superiority.

Navy Making Tests

The Navy has two of the German so-called Type 21 submarines now in operation for testing and evaluating purposes. It is true our own submarines, when the war ended, had few, if any of some of the more important German advancements. We had submarines that were materially much better built than the Germans. We had superiority in electronic, sonar and torpedo fire-control gear. These, however, were simply improvements in the established practices of submarine construction and operation.

But the United States has one superiority. The experience gained by the American Navy in using carefully trained personnel and developing by trial and error a superior tactical use of the submarine, mutually supported by all elements of the Navy team, is ours alone. It cannot be taken from us nor can it be readily imitated.

There are countless indications of the increased importance of the submarine in the navies of tomorrow. Atomic energy is certainly the perfect answer to submarine propulsion requirements. Once worked out it becomes an unlimited power source and, more than that, it would require no oxygen supply for operation. Atomic propulsion would eliminate the link with the surface provided oxygen could be carried in sufficient quantities to support the life of the crew members.

Unfortunately, one of many innumerable obstacles to the installation of atomic propulsion in a submarine is the present limited space available in an undersea vessel. An atomic propulsion plant is going to require a lot of room.

The U. S. Navy probably will lay out several submarine types for the future so that we may do varying tasks better. In a future world of guided missiles, atomic warheads, and atomic propulsion the submarine will be a vessel with missions to perform which in many cases are now designed to be done by surface ships and aircraft alone.

Science News Letter, April 19, 1947

AERONAUTICS

Teleran for Safe Landing

➤ A NEW AIRPLANE navigation and bad weather landing system has come out of the laboratories and is ready for development by engineers into a form suitable for airport installation.

The system, developed by the Radio Corporation of America, is named "Teleran." The name was coined from the chief ingredients of the new device, television and radar.

RCA engineers told scientists and aviation writers that Teleran as a practical device is not here, but "just around the corner."

In the new aircraft navigation and landing aid, ground-based radar, the same or similar to that in the Ground Control Approach equipment (GCA), scans the sky for miles about an airport.

Television brings the picture on the ground radar scope to the pilot in his cockpit in the plane.

The pilot sees not only the shadow picture on the radar scope but at the same time a superimposed map of the airport area. He sees his own plane as well as others represented by spots on light. The same television can also give the pilot weather maps or written traffic instructions. The picture is simplified by a screening process and made brilliant with special phosphors.

A special transmitter and receiver unit, called a transponder, gives the pilot a separate radar picture for each altitude.

The transponder has a receiver and transmitter connected together so that the transmitter emits one or more pulses when the receiver picks up a pulse separated at a time interval that corresponds to the plane's altitude.

An automatic device called a discriminator circuit can be made to sort out automatically the responses sent by the ground station according to the altitude.

RCA scientists have been engaged for a half-dozen years in developing Teleran. A recently-perfected part of the system is a simplified television camera that is compact. Teleran can be used in air navigation, traffic control, collision prevention and instrument approach to an airport.

The same apparatus in the plane is used for all operations, and its total weight is about 100 pounds.

Science News Letter, April 19, 1947

TELERAN—The new RCA television-radar air navigation and traffic control is installed in the cockpit of a flight simulator. Data are shown on a screen on the instrument panel.

VETERINARY MEDICINE

Eggs Found to Carry Serious Poultry Disease

➤ EGGS MAY BE the "Typhoid Marys" of one of the most serious of poultry diseases. Dr. W. A. Boney, Jr., of the Texas Agricultural Experiment Station, has discovered that turkey eggs can harbor the germs of the disease known as fowl typhoid. Although he has been able to isolate the organism from only one egg out of 374 examined, research men regard his findings as significant. Eggs have long been suspected as carriers of fowl typhoid, but efforts of earlier workers to locate the causal organism in them apparently were unsuccessful.

Dr. Boney states, in his report in the *American Journal of Veterinary Research,* that the organism can be isolated easily from the reproductive systems of both male and female birds. He points out that transmission by way of eggs may in some cases explain why outbreaks of fowl typhoid occur in brooder houses or on ranges where it seems impossible to account for its introduction from an outside source.

Science News Letter, April 19, 1947

AERONAUTICS

Hovering Makes Helicopter Require More Horsepower

➤ ABILITY to hover on the part of a helicopter creates a special problem in power plant design for this type of aircraft, the Society of Automotive Engineers meeting in New York was told. Smaller engines could be used if pure hovering were not required.

Horsepower required to hover at zero speed is very large compared to the minimum power required at significant forward speeds for either the helicopter or the airplane, Robert A. Wolf and Carl P. Spiesz, of Bell Aircraft Corporation, declared.

If short ground runs are available to the helicopter, it can take off at reasonably low powers with loads comparable to airplanes, they stated. It is quite conceivable that tomorrow's cargo helicopters, operating from airports where pure hovering is not required, will have smaller power plants or will carry greatly increased loads.

Power plant weight is an important consideration in the helicopter, and continuous research is needed, they said, looking toward reducing engine weight and increasing horsepower output.

Jet-propelled rotors will some day be successful, they predicted. The blade-tip jet appears to offer promise because it might produce reasonable propulsive efficiencies at the fast travelling blade tips, and would produce a light-weight, simple power plant.

Science News Letter, April 19, 1947

NUCLEAR PHYSICS

Uranium Can Give Birth To Triplets and Quadruplets

➤ WHEN URANIUM, the atomic bomb element, fissions it can give birth to triplets and quadruplets as well as the conventional twins of hearts of other lighter elements.

This discovery, announced in the *Physical Review*, was made by two Chinese and two French scientists working in Paris at the nuclear chemistry laboratory of the College of France.

When a uranium atom splits into three, instead of the usual two atomic fragments, more atomic energy is actually released.

Since the ternary fission occurs only about once while 300 or more ordinary fissions are happening, this increase of energy is not very important.

Still rarer are the cases of quaternary fission in which four fragments are produced.

The new fission processes were discovered by use of photographic plates soaked in a uranium compound and exposed to slow neutrons, the kind of particles that sets off the atomic bomb.

The scientists who did the experiments are Tsien San-Tsiang, Ho Zah-Wei, R. Chastel and L. Vigneron.

When uranium and plutonium fission they give off relatively long-range helium atoms, called alpha particles, flying through eight inches of air. This was discovered at the Los Alamos atomic bomb laboratory in 1944 and only now released from wartime secrecy. When observed by Drs. G. Farwell, E. Segre and C. Wiegand it seemingly was not too important in building the bomb and the investigation of this effect is only now being continued.

Science News Letter, April 19, 1947

ORDNANCE

Largest Water Tunnel To Test Navy Equipment

➤ A WATER TUNNEL, believed to be the largest in the world, will be built at the Ordnance Research Laboratory of Pennsylvania State College under an agreement between the College and the Navy.

Designed for testing Naval underwater equipment, the giant tunnel will have a capacity of about 130,000 gallons of water. It is to be a sort of water version of the famous wind tunnels used to test model aircraft.

Expected to be completed in less than two years, the tunnel will be constructed as a closed circuit with water circulated by an adjustable pitch propeller. A motor of 1,750 base power will be used to circulate the stream at top speed. The empty tunnel shell will weigh 120 tons.

Some jobs planned for the tunnel include research on improved body shapes for submarines and torpedoes and the development of superior propellers. Elaborate equipment will be used to measure the performance of models in the water tunnel.

Water speeds ranging from 4 to 35 nautical miles per hour will be produced in the test section of the tunnel which will be four feet in diameter and 14 feet long.

The tunnel will be housed in a new building with offices, service shops and other facilities for preparing and testing models.

Science News Letter, April 19, 1947

IN SCIEN

AERONAUTICS

Two Inventions to Improve Safety, Travel in Planes

➤ TWO INVENTIONS aimed at the improvement of air travel and its greater safety are among new U. S. patents.

One, a pickup tow by means of which a plane in the air can help another plane to get up off the water with a minimum run, is the invention of the late Richard C. du Pont of Granogue, Del. The plane to be towed sets up a loop of line, made of nylon or other stretchable material, on two uprights, either from its wing-tips or from a twin tail assembly. The towing plane swoops over it, with its pick-up hook held in proper position by an oblique rod. As soon as the hook engages the loop, the full length of towline needed is run off a braked drum, and the lift begins. Once airborne, the towed plane can cast off the towline when ready.

Rights in this invention, covered by patent 2,418,702, have been assigned to All American Aviation, Inc.

The other invention, protected by patent 2,418,798, is intended to minimize injuries to passengers in crash landings or collisions. More people are hurt in such accidents by being slammed forward against the seat in front than in any other way. Arnold Whitmer of Buffalo has designed a quickly inflatable air cushion, to be stowed in collapsed condition in the back of each seat, which can be instantly blown out to functioning position when the pilot sees trouble ahead.

Science News Letter, April 19, 1947

OPTICS

New Filter for Infra-Red Is Opaque to Visible Rays

➤ TWO Massachusetts inventors, R. G. Shepherd, Jr., of Needham Heights and C. D. West of Cambridge, present a filter that is opaque to visible light but transparent to infra-red rays, for patent 2,418,605, which they assign to the Polaroid Corporation. The filtering properties are embodied in a sheet of dyed regenerated cellulose, which is protected against mechanical injury by placing it as the sandwich layer between two panes of glass.

Science News Letter, April 19, 1947

E FIELDS

ANIMAL HUSBANDRY

High-Bred Cows Are Not So Fertile or Long-Lived

➤ ARISTOCRATIC cows, bred and selected through generations for high milk and butterfat production, may be uneconomic because they do not live long enough and bear a sufficiently large number of calves. This dairyman's dilemma is pointed out by scientists at the New Jersey Agricultural Experiment Station.

Average life of high-bred cows under their observation is seven years, which means they "come in fresh" only about four times, producing only four calves. The two most frequent causes of the decline in productivity of such cows, which condemns them to the slaughterhouse, are udder troubles and partial or complete sterility.

Breeders in New Brunswick have embarked on a program of selection for longer life and higher fertility, even if a slight sacrifice in annual milk production has to be made.

Science News Letter, April 19, 1947

MEDICINE

Zirconium Used to Treat Atomic Age Plutonism

➤ A TREATMENT for the new atomic age disease, plutonism, has been discovered at the Argonne National Laboratory in Chicago. "Encouraging results" in the preliminary trials are reported by Dr. Jack Schubert, now at the University of Minnesota Medical School in *Science* (April 11).

The treatment consists in displacing the poisonous radio-element, plutonium, from the body by injections of a harmless metal, zirconium.

While no one has suffered from plutonism so far, scientists worry lest it become a health peril to atomic energy workers, like the radium poisoning that struck watch dial painters after the first World War. The hazards of plutonium poisoning are much greater than those of radium poisoning because of the relatively large amounts of plutonium available and the greater numbers of persons exposed to it.

Plutonium and many other long-lived radio-elements which find their way into the body are deposited mainly in the skeleton. An appreciable amount of plutonium also gets into the liver and spleen. Zirconium acts first to displace plutonium from the liver. Later the zirconium migrates to the bones and slowly but continuously displaces the plutonium deposited there, driving it out of the body. The extent to which it does this depends on the amount of zirconium in the bones in relation to the amount of plutonium.

The encouraging results with zirconium were obtained in studies with dogs and rats. Further studies are under way to determine its effectiveness in radio-yttrium poisoning and other radio-elements.

Science News Letter, April 19, 1947

POPULATION

Latin-American Countries Crowded Without Refugees

➤ LATIN-AMERICAN lands do not offer the wide havens of refuge and resettlement that have been wishfully pictured for uprooted European populations, William Vogt, chief of the Pan American Union's conservation section, declared in a Cosmos Club lecture in Washington.

Instead, from thirty to forty millions of the people who already inhabit the countries south of the Rio Grande are in need of resettlement because of the exhaustion of the lands on which they are now living and the rapid increase in population.

As examples, Mr. Vogt pointed to conditions in El Salvador and Venezuela. In the small Central American republic the population is so dense that the area of actually tillable land now averages only one-half acre per person. Venezuela, on superficial examination, appears to be under-populated, because of the relatively small number of people living in its great area. However, the actual living space is crowded because geographic barriers at present impassable prevent utilization of a great deal of the country's map area.

Land use in most Latin-American countries is extremely destructive to the soil, Mr. Vogt stated. Forested slopes are cleared and planted to crops, only to have the soil gullied and washed away by the heavy rainfall. With no soil left, the people soon lack food. And in the meantime a declining death rate and a maintained birth rate increase the number of mouths to feed.

Science News Letter, April 19, 1947

NUTRITION

Special Diets According To Jobs to Be Developed

➤ YOUR doctor may some day in the future prescribe a diet for you according to your particular job. Workers in automobile plants might get one kind of diet, while workers in the paint industry or in dye houses would get other diets.

Whether special diets could protect workers from illness and what such diets should be are subjects of a long-range research project at Columbia University. Dr. Leonard J. Goldwater is in charge of the research under a grant of $11,000 from the U. S. Public Health Service's National Institute of Health.

"It has long been known," Dr. Goldwater said, "that individual workers in the rubber, automobile, paint, dye and other industries show marked variations in the way they react to harmful dusts, gases and fumes. Some are relatively unaffected, while others become seriously ill. Present treatments for these occupational illnesses are largely unsatisfactory.

"There have been sporadic reports that vitamins and other nutritional factors may play a part in determining whether workers are susceptible or resistant to harmful atmospheric contaminants. We intend, therefore, to expose white rats fed on various types of diets to all the different types of toxic fumes found in industries manufacturing chemicals, dyes, solvents, explosives and other products. The variable nutritional substances to be added to the rats' diet will consist mainly of vitamins, proteins and minerals."

Science News Letter, April 19, 1947

CHEMISTRY

Electrolytic Method Gets Cobalt from Natural Ore

➤ A SUCCESSFUL commercial process for obtaining the metal cobalt from its natural ores was described at the Electrochemical Society meeting in Louisville, Ky., by F. K. Shelton and associates of the U. S. Bureau of Mines, Boulder City, Nev. It is an electrolytic method; the product is a high-grade cobalt.

The process comprises roasting the cobaltic ore, extracting the arsenates which occur in the ore by a caustic leach, extracting the cobalt from the residual solids in an acid bath, purifying the leach solution, preparing cobalt carbonate from the purified solution, and obtaining the cobalt from it by electrolytic action.

Science News Letter, April 19, 1947

DENTISTRY

Bad Teeth By Inheritance

Part of tooth troubles is due to heredity. If parents have good teeth, children have little trouble with theirs.

By JANE STAFFORD

➤ IF YOU have a lot of toothaches and have to spend hours in the dental chair getting cavities drilled and filled, you probably drank the wrong kind of water as a child. But then, again, at least part of your tooth troubles is probably due to heredity.

The importance of the parental influence in the liability of teeth to decay is stressed by Dr. Henry Klein, senior dental officer, U. S. Public Health Service. According to his findings, the mother who says, "My daughter gets her poor teeth from me," is right.

A study of the teeth of 5,400 parents and children in 1,150 families furnishes considerable evidence for this view. The families were of Japanese ancestry, studied at the Colorado River Relocation Center.

Inherited Tendency

When both parents had little or no signs of dental disease, their children also had good teeth, Dr. Klein found. When both parents had poor teeth, the children also had much dental trouble. If one parent had good teeth and the other had medium or very bad teeth, the children had more tooth decay than children both of whose parents had good teeth, but less than that seen in children with both parents having poor teeth.

The state of the mother's teeth seemed more closely related to that of the daughter's than the state of the father's teeth did. Susceptibility to tooth decay, Dr. Klein concluded from this study, seems to run in a family, very likely is inherited and may be sex-linked.

The hereditary influence on teeth is probably strengthened by another fact, Dr. Klein's studies disclosed. This is that like tends to mate with like when it comes to teeth as well as eye color and nationality. In this study Dr. Klein was assisted by Dr. Toyo Shimizu, dental officer of the Office of Indian Affairs.

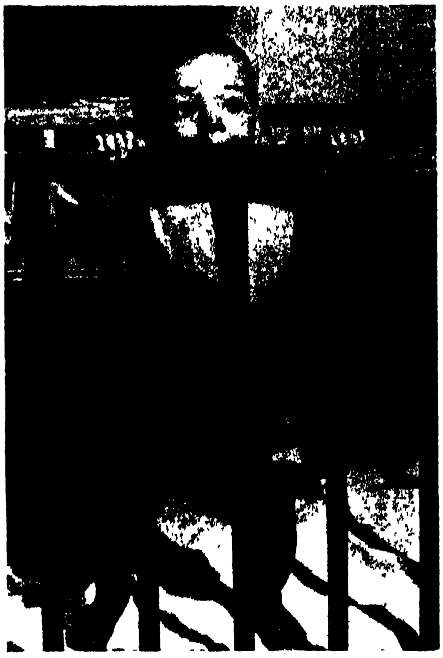
Men and women with large numbers of DMF (decayed, missing and filled) teeth tend to marry men and women who on the average have more than the usual number of DMF teeth for their age and sex, the dentists found.

The reverse is also true. Those with good teeth tend to marry those with better-than-average teeth.

The dental officers do not think this is a matter of conscious choice, however. Besides observing that their findings are consistent with the view of human biologists that like tend to marry like, the dentists point out that people who marry tend to come from about the same local geographic background. They would therefore have shared the same environmental conditions when their teeth were being formed.

Even with a hereditary start toward poor teeth, a child may escape with only a few toothaches and cavities if he got the right kind of water to drink while his teeth were being formed.

Small amounts of the chemical, fluorine, in the drinking water may help prevent tooth decay. This is a fairly well-known story now, and several communities are adding fluorine to their water supplies to take advantage of its anti-caries action.



CHARACTERISTIC POSE—This youngster is using the rail on his play pen as a teething ring.

This measure was not expected to help anyone except children born in those communities after the water supply was fluorinated. Fluorine, it has been believed, only protects the teeth of persons drinking fluorinated water from birth and during the period while the teeth are developing in the jaw.

Good Effects Applied

Its good effects, it has just been discovered, can be applied at considerably later ages. First and second molars and second bicuspids that are already erupted in the mouth can be protected by fluorinated drinking water if they are exposed to the fluorinated water soon after eruption.

This means that in cities where fluorination has been started, not only the new babies and toddlers, but children up to about 14 years old will have better teeth and fewer toothaches. This finding of Dr. Klein's was also made on some of the Japanese children relocated during the war. The children in this study all had previously lived in Los Angeles and were transferred to centers in California and Arizona.

Tests with Fluorine

At the California center the drinking water contained almost no fluorine. At the Arizona center the water supply contained just about the caries-preventing amount of fluorine. Children between eight and 14 years of age at the time of relocation who went to the fluorine region had considerably fewer new caries in the teeth most susceptible to decay than the children who lived two years in the fluorine-free water region.

Drinking water may also contain substances that make teeth more vulnerable to decay as well as fluorine which protects against caries. Evidence for this was discovered by Dr. Klein in examinations of the teeth of more than 3,000 New Jersey school children. These were made with the cooperation of Dr. J. M. Wisan, New Jersey health department's dental chief, and Dr. John F. Cody of the U. S. Public Health Service.

The children lived in five communities of southern New Jersey. In three of these communities the water supplies contained enough fluorine to favor resistance to tooth decay. In the other two, the water was considered fluorine-free.

Fluorine Benefits

Of the 3,000 children, 1,307 had been born outside the five communities and moved into them at various ages. Of those moving into the fluorine communities, the younger the child was at the time he arrived there and the longer he lived there, the less his teeth were attacked by decay. This showed the now generally recognized effect of fluorine in drinking water in favoring resistance to tooth decay.

By contrast, among the children moving into the fluorine-free areas, the most recent arrivals had the best teeth while those who had lived in the area the longest had the worst teeth so far as decay was concerned.

Decay Cause Sought

Scientists are now actively searching for the substances in the water of the communities that make teeth more vulnerable to decay. Superficial examination shows that the nonfluorine waters in the communities are acid enough to need treatment with alkali and that they contain so much excess iron that it is necessary to aerate the water to remove it. An unusually high content of nitrates has also been found in these waters.

Regular use of an anti-decay chemical treatment of the teeth of all children is now reccommended by the American Dental Association.

The chemical is sodium fluoride. It would be applied by the child's dentist in a 2% solution to the crowns of the teeth twice a year after a preliminary series of at least four treatments for each tooth.

HANDED DOWN—Babies fortunate enough to have parents with good teeth are likely to have few toothaches and spend little time in the dentist's chair.

Because sodium fluoride is a poison, the treatment should be given by a dentist who is in position to guard against use of too strong a solution or other potential dangers.

The treatment is advised as a general preventive measure, but does not have any 100% guarantee that it will prevent tooth decay in all children. It has cut down the occurrence of decay as much as 40%, dentists who have tried it have reported.

The treatment is not effective on the teeth of grown-ups, so far as present evidence goes.

The mechanism by which fluorides inhibit tooth decay is unknown. Current theories are that the fluorides provide a protective factor in tooth enamel and that the drug inhibits the growth of acid-producing bacteria believed to be a cause of dental decay.

Science News Letter, April 19, 1947

METALLURGY

Alloy for Aircraft Saves Weight, Gives Strength

➤ A NEW zinc-magnesium-copper-aluminum alloy was described to the Society of Automotive Engineers in New York by George Snyder and Frank J. Crossland, Boeing Aircraft Corp., which can be used in certain aircraft structural applications to save weight and increase strength. Its most significant advantage, they stated, is increased strength for both compression and tension. It is claimed to be about 55% stronger than the present standard aircraft material.

The metal, designated 75ST, contains approximately 5.5% zinc, 2.5% magnesium, and 1.5% copper. Its maximum physical properties are obtained by a special heat-treatment followed by artificial aging.

Science News Letter, April 19, 1947

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NUTRITION

Army Rations Need Not Vary with Climate

➤ A SOLDIER wants about one-tenth of his daily food to be meat or other protein foods, whether he is sweltering on a Pacific island or enduring the Arctic cold. And he eats from one-third to two-fifths of his food as fat, given a chance to eat all he wants from a wide variety of rations. But he eats a good deal more in the Arctic than in the tropics.

These findings were made by Drs. Robert E. Johnson, now at the U. S. Army Medical Nutrition Laboratory, Chicago, and Robert M. Kark at the Harvard Fatigue Laboratory in Boston.

In the desert with the temperature 92 degrees Fahrenheit soldiers each ate 3,100 calories daily on the average. In the Arctic at 30 degrees below zero Fahrenheit, they consumed 4,900 calories daily. But the proportion of protein and fats chosen to the total calories remained about the same.

Science News Letter, April 19, 1947

ENGINEERING

New Methods, Old Type Of Houses for Future

➤ HOUSING SHORTAGE note: modern soil engineering science is reviving two of the oldest types of homes man has built.

Strong, durable houses can be built of adobe or rammed earth, a wartime report by the Board of Economic Warfare declares. The report, released by the Department of Commerce, suggests some modern innovations for the building methods which date back to prehistoric times.

Rammed earth buildings, made by tamping a damp mixture of sand, silt, clay and gravel into wall forms, should include a protective finish in places with a rainfall of more than 25 inches a year or a rainy season. Cement-stabilized rammed earth is a sturdier construction material than the more ancient product.

Latest development in adobe construction, which was used by Indians of the Southwest centuries ago, is asphalt-stabilized adobe blocks.

The report on rammed earth and adobe buildings was prepared in 1943 for use of the U. S. Army in North Africa.

Science News Letter, April 19, 1947

Do You Know?

Spring-blooming *shrubs* are best pruned after flowers have faded.

The American Meteorite Museum, Winslow, Ariz., has a *meteorite* containing gold and others showing diamonds.

A mill in Leicester, England, has a new machine that makes 32 full-fashioned *stockings* in 35 minutes.

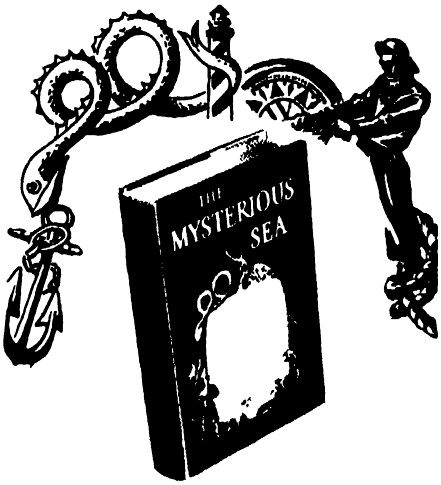
Copper and brass *ornaments* in a house can be cleaned with hot vinegar or lemon juice and salt.

In the Western Hemisphere, Mexico and Puerto Rico stand the highest in *birth* rate; they stand high also in death rate and population increase rate.

Shady lawns that get as much as three hours of sunshine a day do not need special *grass* seed; the soil, however, may need special treatment because of the tree roots.

Australian cave *paintings*, thought to date back to Australia's stone age, were annually retouched by Australian natives before the arrival of white men with red and yellow ochre and pipeclay white.

Cows on New Zealand large dairy farms are *milked* by machines in an "assembly-line" procedure; they enter the milking shed in single file to a stall at the head of the line and, after being milked, pass out through the front of the stall.



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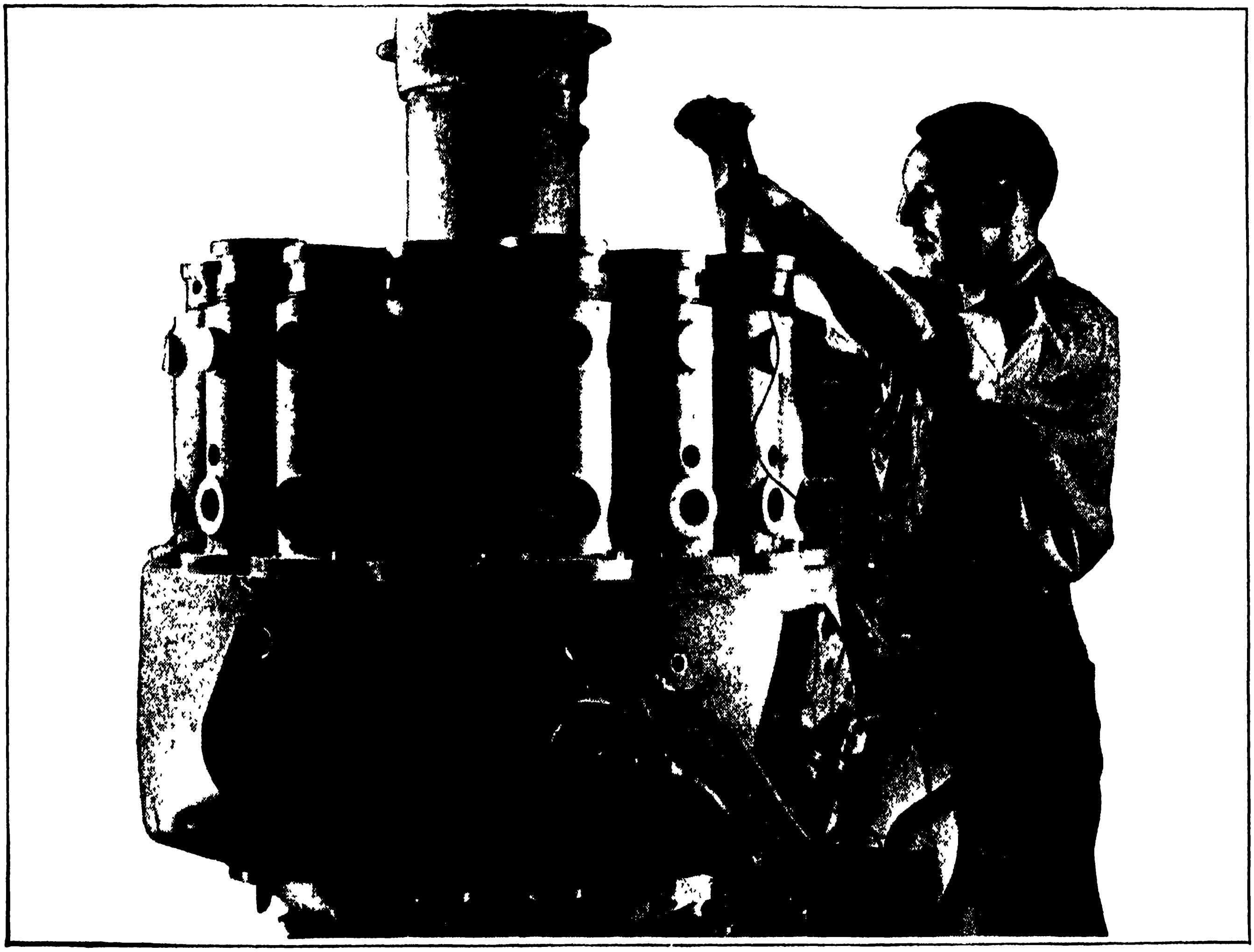

He tests engines that don't exist

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AGRONOMY

NATURE RAMBLINGS

by Frank Thone

Prairie and Plow

➤ WHEN FARMERS first transplanted themselves from the Old World to the New, most of them came from countries that had once been forest-covered. Land had to be won with the ax before it could be given to the plow. Unforested land was mostly moor, heath, rocky upland or swamp—all unfit for farming, though the swamplands might be reclaimed by draining.

They found essentially similar conditions in the eastern part of this country, where the first settlements were established. When a pioneer went out to win a farm from the wilderness, the first thing he had to do was "make a clearing". The trees were cut down, and except for the logs he needed for his cabin and rail fences, they were burned to get rid of them. Potash, leached out of the ashes, was used mainly in soap-making, though some of it might be traded for such "store goods" as gunpowder, calico, salt and ironware. Then the stumps were pulled or blown out, and finally the land could be plowed and planted.

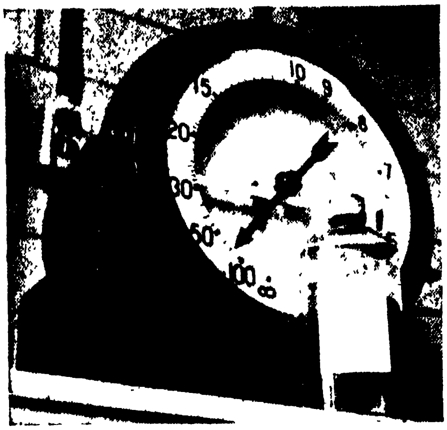
Not until the generation after the Revolution, when the first great wave of migration broke into the West, did settlers encounter extensive natural grasslands. There were "prairie islands" in the forest cover of Ohio, and when the settlers got to northern Illinois they found a continuous sea of tall grass, with timber belts confined mostly to the banks of rivers.

At first they didn't know what to make of it. A doctrine arose, and was widely accepted, that only soil that could grow such big things as trees was "strong" and could produce good crops; soil that grew only grass was "weak" and not fit for farming. So for some years the farmers stuck stubbornly to the river banks and did not attempt to break the prairie sod, which was really much richer than the cut-over land they were cultivating.

There were two other, and better, reasons for the failure at first to put the grasslands under the plow. Early transportation followed the rivers a good deal, going either by boat or along roads that stuck to the easy water-level grades.

The other reason was the unsuitability of the early part-wooden or cast-iron plows for the tough task of ripping through the matted, cordlike roots of the prairie grasses. But about a hundred years ago steel plows began to be built —big ones, too, drawn by six or eight span of oxen. They made possible the conquest of the long-grass prairies, which are now the world's most productive corn lands.

Science News Letter, April 19, 1947



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APPLIED CHEMISTRY—Sherman R. Wilson and Mary R. Mullins—*Holt,* rev. 714 p., illus., $2.36 With a unit on photography and discussions of new drugs, vitamin advances, alloys, synthetic rubber and textiles, this high school text emphasizes the importance of chemistry in living.

ATOMIC ENERGY COMMISSION. Official Records; Special Supplement· Report to the Security Council, *Columbia Univ. Press,* 141 p., paper, $1. The five parts of this report, in French and English, cover proceedings, findings, recommendations, first report on scientific and technical aspects of the problem of control and on safeguards to ensure the use of atomic energy only for peaceful purposes.

CHEMICAL BURNS OF THE HUMAN CORNEA—Ralph McLaughlin; CHEMICAL BURNS OF THE RABBIT CORNEA—C. P. Carpenter and H. F. Smyth, Jr.—*Mellon Inst.,* 10 p., paper, free. These are reprinted from the "American Journal of Opthalmology".

CONTRIBUTIONS FROM THE UNITED STATES NATIONAL HERBARIUM, Vol. 30, Part 1, *Gov't Printing Office,* 404 p., paper, $1. This volume contains "A Botanical Bibliography of the Islands of the Pacific" by Elmer D. Merrill and "A Subject Index to Elmer D. Merrill's 'A Botanical Bibliography of the Islands of the Pacific'" by E. H. Walker.

DOORWAYS TO SCIENCE—George W. Hunter and Walter G. Whitman—*Am. Book,* 546 p., illus., $2.40. A text for a general science course in junior high school, it attempts to relate study to the world of science surrounding the individual. By including vacation hobbies and vocations, it develops useful leisure time pursuits.

FINAL JUDGMENT—Victor H. Bernstein—*Boni & Gaer,* 289 p., $3.50. The degeneration of science is told here. Using documents only recently available from German sources, this story of Nuremberg reveals the full horror of the sadistic and brutal "experiments" of Nazi so-called scientists.

FUNDAMENTALS OF EARTH SCIENCE—Henry Dewey Thompson—*Appleton-Century,* 461 p., illus., $3 75. Collected into one course, physiography, mineralogy, geology, geography and meteorology are treated as earth sciences and this college text serves to stimulate further studies and to satisfy the general student. Generous use of aerial photographs is especially noteworthy.

GOING FORWARD WITH SCIENCE; OUR WORLD OF TOMORROW, BOOK VII—G. S. Craig and John Urban—*Ginn,* 412 p., illus., $1.56. For grade-schools, this well-written text discusses The Pond in the Classroom, The Earth's Mineral Treasures, A World of Light and Color and other interesting topics.

HEATING, VENTILATING, AIR-CONDITIONING GUIDE, 1947—*Am. Soc. of Heating and Ventilating Engineers,* 25th ed., 1282 p., illus., $6. Technical data section includes reference material on design and specification of equipment and results of laboratory research; a manufacturers' catalogue data section is also present.

JANE'S FIGHTING SHIPS 1944-45 (Corrected to April, 1946)—Francis E. McMurtrie—*Macmillan*, 636 p., illus., $19. Presenting a picture of Allied naval strength at its peak, this edition includes vessels which have already been removed from the effective list. As full listing as possible is found in the War Loss section. Because of slow release of information for security reasons, and others, details sometimes conflict.

POSTGLACIAL FOREST SUCCESSION, CLIMATE, AND CHRONOLOGY IN THE PACIFIC NORTHWEST—Henry P. Hansen—*American Philosophical Society*, Transactions, Vol. 37, pt. 1, 130 p., illus., paper, $2.25. The results and interpretations of pollen found in 70 sedimentary columns from widely scattered areas give a picture of the major vegetational trends and climatic cycles of the region.

PRACTICAL EMULSIONS—H. Bennett—*Chemical Pub.*, 568 p., 2nd ed. rev., $8.50. A practical book on emulsions for industrial use with a comprehensive list of emulsifying agents and the most recently developed formulae.

SCIENCE: A STORY OF DISCOVERY AND PROGRESS—Ira C. Davis and Richard W. Sharpe—*Holt*, new ed., 538 p., illus., $2.36. By beginning each unit with the historical background of the subject discussed, this junior high school text in general science helps pupils appreciate the scientific contributions to civilization.

THE STORY OF WATER SUPPLY—F. W. Robins—*Oxford Univ. Press*, 207 p., illus., $5.50. Of vital necessity for the establishment of communities and their survival, water has dictated their location and touched off wars whose outcome depended entirely on control of a dependable water source.

TOWARD BETTER PHOTOGRAPHY—Vincent McGarrett—*Am. Photographic Pub.*, 260 p., illus., $3. With chapters on color films, movies, and trouble shooting as well as selecting a camera and dark room technique, the careful reader becomes a better operator.

TRAINING HIGH SCHOOL YOUTH FOR EMPLOYMENT—C. E. Rakestraw—*Am. Tech Soc.*, 217 p., illus., $3.50. A plan is offered herein whereby vocational training on a cooperative part-time basis can be offered in high schools. Cooperative diversified occupations programs have been tried and found to fill the gap between school and employment.

Science News Letter, April 19, 1947

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❁ *WHEELED suitcase, recently patented, can be rolled instead of carried. Two small wheels, attached on one end near the bottom when the case is standing in ordinary position, touch the floor when the suitcase is tilted by means of an extension handle on the top near the other end.*

Science News Letter, April 19, 1947

❁ *FOOD PROCESSING unit, for the home kitchen, is built to fit into a floor cabinet and be completely covered when not in use. When open, its electric motor mounting permits the tool-holding shaft to be positioned where needed to operate stirrers and other kitchen tools.*

Science News Letter, April 19, 1947

❁ *BOAT PROPELLER, in combination with a steering unit, is at the end of a shaft beyond an attached vertical fin that acts as a rudder. The propeller shaft on this device, just patented, is united at the rear of the boat with the motor shaft by a universal joint, permitting horizontal and vertical movement.*

Science News Letter, April 19, 1947

❁ *RUBBER FACING, on the edge of an airplane's propeller blade to prevent the formation of ice, consists of a sheeting of electricity-conducting rubber between two sheets of non-conducting rubber. Passage of electricity through the center sheet causes heat. Ice guard section of the blade is being held in the picture.*

Science News Letter, April 19, 1947

❁ *TWO-BLADED peeler for vegetables is clamped to the kitchen table and operated with a hand crank. The fruit or vegetable to be peeled is placed on a central spearhead, and rotated in contact with two blades. The holding frame is set at an angle to allow peelings to fall to the table.*

Science News Letter, April 19, 1947

❁ *DEVELOPING package for photographers contains all the essentials for development and printing, including darkroom lamp, thermometer, measuring graduate, three trays, and packages of the chemicals needed. It also includes instructions on developing and printing.*

Science News Letter, April 19, 1947

❁ *STEEL SHEETING, only .006 inch thick and coated with a tin alloy, is claimed to be an excellent thermal insulator in construction. It reflects most of the radiant heat, keeping a house cool in summer and saving fuel in winter. It lasts for the lifetime of a building.*

Science News Letter, April 19, 1947

Question Box

AERONAUTICS

How are radar and television combined to make safer landing? p. 247.

AGRONOMY

Why were early western settlers unsuccessful with the plow? p. 254.

ASTRONOMY

How large is the world's largest telescope? p. 243.

CHEMISTRY

How can cobalt be gotten from its natural ore? p. 249.

DENTISTRY

Can tooth troubles be due to heredity? p. 250.

MEDICINE

How can a blue dye save those sick from radiation? p. 244.

NAVIGATION

What is the Navy doing to improve our submarines? p. 246.

Why are U. S. submarines out of date? p. 246.

NUTRITION

What is in carrots that gives longer life? p. 243.

ORDNANCE

What jobs are planned for the large water tunnel the Navy is building? p. 248.

PHYSICS

What has been developed in long distance dialing? p. 244.

POPULATION

Why can Latin American countries not take the overflow of people from Europe? p. 249.

TEXTILES

What part of chicken feathers is used in making silky fiber? p. 245.

VETERINARY MEDICINE

What is thought to be a carrier of fowl typhoid? p. 247.

Where published sources are used they are cited.

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SCIENCE NEWS LETTER

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Long-distance Television is twenty years old

At the 1927 demonstration, Dr. Herbert E. Ives explained the television system developed in Bell Telephone Laboratories

April 7 is a notable day in communication history, for on that day in 1927 was the first demonstration of television over long distances. Large-scale images were flashed from Washington, D.C., by wire and from Whippany, N.J., by radio to a public demonstration in New York City. "It was," said a newspaper, "as if a photograph had suddenly come to life and begun to smile, talk, nod its head and look this way and that."

That was the first of many public demonstrations, each to mark an advance in the television art. In 1929 came color television, and in 1930 a two-way system between the headquarters buildings of A. T. & T. and Bell Laboratories. When the first coaxial cable was installed in 1937, television signals for 240-line pictures were transmitted between Philadelphia and New York and three years later 441-line signals were transmitted. By May, 1941, successful experiments had been made on an 800-mile circuit.

End of the war brought a heightened tempo of development. Early in 1946 began the regular experimental use of coaxial cable for television between New York and Washington, and a few months later a microwave system for television transmission was demonstrated in California.

Transmission facilities will keep pace as a great art advances to wide public usefulness.

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2 JUN 1947

MINING

Coal Mines Can Be Safer

Men, money, and enforcement of safety regulations can prevent mass loss of lives in mines. Falling roofs and explosions cause most fatalities.

▸ THE NATION'S coal mines can be made safer, but it is a job which will need men, money and stricter enforcement of mining safety codes.

Safety in coal mining means primarily good ventilation, the prevention of mine roofs from falling, dust-laying, and the use of proper explosives, handled only by experts, in the necessary blasting to loosen the coal from its seams. There are other necessary steps, but these are the most important.

Falling roofs in coal mines cause more fatalities each year than any other type of accidents. They are prevented, or at least lessened, by what is known as timbering or shoring. This means the placement of supporting columns in newly excavated cavities as rapidly as the cavities are made. It is an expensive job, requiring much skill, labor and timber. Constant inspection must be made to see if additional timbering is needed. Even with the best of shoring some roof falls are apt to occur. Men are sometimes injured also by debris loosened from the walls or faces on which the miners are working.

Explosions Rank Second

Explosions rank second as causes of mine fatalities. They may be of gas or of very fine coal dust. Ventilation is the method by which the explosive gases are removed, and ventilation also removes much of the coal dust that is suspended in the air. Powerful forced ventilation is required. Under the government mining safety code, giant blowers are stationed outside the mines to force fresh air down special conduits into the mine and to each group of miners. Separate conduits remove the foul air, together with any gases that have collected and with the suspended coal dust.

Settled dust, on the walls and roofs of coal mines, is often worse in an explosion than the minor amount of suspended dust in a properly ventilated mine. The shock waves that result from what might be a minor explosion drives this settled dust into the air where it in turn adds to the explosion.

Rock dusting is the best known preventive. Rock dust is a noncombustible, specially treated pulverized limestone that is applied to the walls and roofs close behind where miners are working. It prevents the accumulation of dust on the surfaces. While limestone dust alone is sometimes used, a more modern practice is the use of a limestone dust that has been so treated that every tiny particle of it is coated with a water-resistant material. Such dust is sometimes scattered by automatic devices in the air ahead of an approaching explosion, in which case it is often effective in halting progress of the explosion.

The present federal mine safety code for bituminous coal mines, which most states now recognize, was prepared by the U. S. Bureau of Mines, representatives of the coal industry and the United Mine Workers of America headed by John Lewis. It was approved by the Secretary of the Interior on July 24, 1946. It is a code to guide mine operators; its enforcement ordinarily rests with state and local authorities.

While the coal mines are under federal administration, the head of this administration probably has the necessary authority to enforce compliance with the code, but does not have the necessary staff. The functions of the Bureau of Mines cover inspection and the reporting of code violations only, and it needs a staff of 250 men, compared with 167 last year and additional inspectors called for in appropriations for the fiscal years 1946 and 1947. The job of this staff: inspecting the 7,000 regularly producing coal mines in the United States.

Science News Letter, April 12, 1947

PATHOLOGY

Atomic Fission Products Damage Brain Tissues

▸ BETA RAYS, which are among the products of atomic fission, can do serious damage to the tissues of the brain, Dr. Rosalind Novick of the University of Minnesota School of Medicine reported before the meeting in Montreal of the American Association of Anatomists.

She had made a close examination of injuries done to the brains of cats by beta rays given off by radium. The injuries were in sharply limited spots, with zones of decreasing severity as the distance from the ray sources increased. At the center there was dead tissue, then a zone of shrunken and darkened nerve cells, then cells that were acutely swollen, and finally uninjured tissue.

Science News Letter, April 12, 1947

MECHANIZED MINING—American coal miners use machinery electrically operated such as the machine cutter shown in the picture. Loosened electrical connections, or sparking caused by dust collection in the machine may cause explosions.

MEDICINE

Why People Are Alcoholic

Latest theory gives double cause: inherited metabolic pattern for handling alcohol plus environment that provides exposure.

➤ THE CHEMICAL constitution you inherited from your parents plus the environment in which you live determines whether or not you become a Lost Week-Ender.

This theory or working hypothesis of the cause of alcoholism is presented by Prof. Roger J. Williams, distinguished vitamin researcher of the University of Texas, in the *Quarterly Journal of Studies on Alcohol* (March).

Jack Spratt and his wife of the nursery rhyme are used by Prof. Williams to illustrate part of his theory, that on the hereditary factors.

"Some people inherently have a strong appetite for fat and can tolerate large quantities of it. Others may have a distaste for fat but crave protein. Such different responses," Prof. Williams says, "must be due to differences in the metabolic machinery of the individuals."

By metabolic machinery, Prof. Williams means the complex mechanisms by which chemicals from food are used to create new body substance and energy. These processes go on by means of enzymes. The fundamental reason why vitamins, or at least many of them, are necessary to life is that they are the raw materials out of which the body must build its enzymes.

Every time an egg cell becomes fertilized and a new organism, chick, rat or human baby, comes into being, it gets from the parent cells the potentialities for producing each enzyme from necessary raw materials. It also gets the potentiality for producing every detail of the metabolic machinery.

The kind of defect in this machinery which results in diabetes, involving failure to handle sugars and starches adequately, is part of a person's metabolic inheritance.

Inherited metabolic machinery also determines, Prof. Williams thinks, the way a person handles alcohol. It may determine whether a person will get violently sick after one drink, whether he gets a laughing jag, or turns morose after drinking, whether he can take an almost fatally big dose of alcohol without showing any sign of drunkenness, and whether or not he becomes addicted to alcohol.

Environment comes into the picture something like exposure to infectious disease. A person may be susceptible to measles, but never get it because he is never exposed to the measles germs. A person with an inherited metabolic machinery that would make him an alcoholic if he started taking alcohol will never become a Lost Week-Ender if he never drinks. Most people can drink without becoming alcoholic because they lack this special machinery, just as most people can eat sugar and starches without becoming diabetic.

Prevention of alcoholism would be possible, Prof. Williams points out, if some way of detecting the alcoholic metabolic machinery could be discovered. He urged further research to learn at least what this machinery is.

Science News Letter, April 12, 1947

ANATOMY

Tense Tops Start Baldness

➤ YOU GET BALD because you get tense on top. A big head may be one cause of the tension. The tension also may be caused by external pressure, as from a tight hat, perhaps, or from the explosion of an atom bomb.

The basis of baldness is a matter of anatomy, Dr. M. Wharton Young, of Howard University, announced at the meeting of the American Association of Anatomists in Montreal.

The top of the head where baldness comes with age does not have as rich a blood supply as the muscular sides of the scalp, where the hair usually hangs on longest. Tension zones in the scalp cut down the blood supply to the top. These tension zones are associated with beginning baldness.

They may result from contraction of the muscles, from continued growth of the skull, or from external pressure. In this connection Dr. Young pointed out that some of the atomic bomb victims developed a senile type of baldness.

Dr. Young produced persistent baldness in monkeys, like that seen in humans, by cutting out curved slices of their scalps and sewing the edges together. This pulled the scalp tight, set up tension areas and baldness followed.

Science News Letter, April 12, 1947

Death of Dr. Valentine

➤ DR. WILLIARD L. VALENTINE, editor of the journal *Science*, published by the A.A.A.S., died April 5 of a heart attack. He was also a trustee of Science Service.

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MEDICINE

X-Ray Sterility Offset

Gland treatment partially restores fertility to female mice exposed to radiation. Other reports from meeting of anatomists follow.

➤ TO A CHRONICALLY atom-jittery world there may be some significance in a report on the partial recovery of female mice after sterilization with X-rays, presented before the meeting of the American Association of Anatomists in Montreal by Dr. J. M. Essenberg of the Chicago Medical School.

As is well known, one of the worst effects of the intense burst of radiation, including X-rays, given off by an atom-bomb is the damage to sex glands that renders both men and women sterile, at least for a time. How much time is required for recovery, or even whether recovery occurs at all in some cases, has not yet been determined, nor is it known what treatment is called for in such cases.

Dr. Essenberg began his investigations on a mouse-sized scale. He exposed a number of young female rats to X-rays in doses heavy enough to cause sterilizing damage to their sex glands. Into the bodies of some of them he made a series of implants of bits of pituitary gland, which is a ductless gland in the head, whose secretion normally promotes the development of sex glands. To others of the sterile mice he gave a commercial preparation of such a sex-gland-promoting substance.

Examination of the ovaries of the sterilized mice thus treated showed some signs of resumption of normal function, though not full recovery. Further work will be required to determine if full recovery is possible under such treatment.

Sulfa Drug Cuts Fertility

In the meantime, one of the sulfa drugs used to combat germ diseases has been placed under indictment for causing lowered fertility, in a paper by Dr. Philip V. Rogers of Hamilton College, who spoke before the meeting.

Sulfaguanidine, in much larger relative quantities than would ever be used for medical purposes, was given to young laboratory rats in their food. Then males and females were placed in breeding cages, and results awaited.

In some cases, the pairs simply didn't mate. In others, no offspring resulted. For the entire group, the average litter size was less than one-third what it had been when the same animals were bred on a drug-free diet.

Polio Can Distort Faces

We are used to thinking of poliomyelitis in terms of children hobbling about bravely with braces on withered legs; but it hits other parts of the body as well. Dr. William M. Rogers of the College of Physicians and Surgeons, Columbia University, told of cases of polio of the face that have come under his observation. The disease caused a wasting away of certain bones as well as of the muscles, offset by an overgrowth of muscles on the opposite side. The result was a marked distortion of the face.

"Shots" Without Needles

If you are one of those who shrink from the inevitable jab of the needle when a "shot in the arm" is necessary, you can take cheer from the new method announced before the meeting by Dr. Frank H. J. Figge and Dr. Robert P. Scherer of the University of Maryland School of Medicine. Taking a hint from accidents that have happened around diesel engines, where extremely fine, high-pressure oil jets from leaky injectors have pierced human skins, they have devised a way of doing the same thing intentionally with a considerable variety of medicinal preparations. They tried it out first on cadavers in the laboratory, then on living volunteers. They claim it gets the dose in deeper and through a larger volume of flesh than the conventional needle method; also (what probably counts most from the patient's point of view) that it hurts less.

Science News Letter, April 12, 1947

MEDICINE

Vitamin E Lack Makes Weak Spots in Heart

➤ LACK of vitamin E in the diet may be a cause of heart failure, if results obtained with rabbits are of wider significance. Rabbits kept on diets lacking this vitamin developed weak spots in various parts of the heart muscle, it was reported to the meeting of the American Association of Anatomists by Dr. Arthur J. Gatz of Loyola University Medical School and Dr. O. Boyd Houchin of the University of Louisville School of Medicine.

Science News Letter, April 12, 1947

BOTANY

California Big Trees Can Be Young Even Though Huge

➤ CALIFORNIA Big Trees, as everyone knows, are the biggest and oldest things on earth. But they aren't all old, and they didn't get big over night; young ones are starting all the time, and growing up into lusty youth. Such a tree is shown in the illustration: it is a half-century old. In 1898 Prof. William E. Ritter of the University of California, later one of the founders of Science Service, took his young wife to see Yosemite National Park. The superintendent of the park gave Mrs. Ritter a seedling Big Tree, which she planted alongside of the then new Ritter residence in Berkeley. The seedling was in either its second or third season of growth, which would make it either 50 or 51 years old now.

Science News Letter, April 12, 1947

YOUNG TREE—This big tree is only 50 or 51 years old.

AGRICULTURE

Research Yields Billions

Besides its most important result in saving lives, agricultural research has given back to the nation about $100 for every dollar invested in it.

By Dr. W. V. LAMBERT

Director of the Agricultural Research Administration

In a radio talk on "Adventures in Science" over the Columbia Broadcasting System.

➤ BENEFITS to the whole nation totaling thousands of lives and billions of dollars started down on the farm with scientific research.

Developed by research, most of the corn grown now is hybrid corn. It is produced by crossing in-bred strains of corn. It not only gives higher yields but has more resistance to disease and drought than the corn that used to be grown. It has what is called hybrid vigor. The special seed stocks are grown by farmers or companies skilled in their production.

To make present-day hybrid corn possible, the Department of Agriculture estimates that it took about $10,000,000 worth of research, covering 30 years. That includes work done at the state agricultural experiment stations, as well as in the Department of Agriculture.

In the one year 1946 the dividend from the research on hybrid corn was three-quarters of a billion dollars.

At least one-fifth of the 1946 3,000,000,000-bushel crop can be traced directly to the use of hybrids.

Cereal Grains

Over the last quarter of a century, plant breeders at the agricultural experiment stations, as well as at the Department of Agriculture, have developed dozens of disease-resistant varieties of wheat, oats, barley, rye, and other grains. Based on records of damage caused by stem rust and other diseases, Agriculture scientists are pretty sure that these new varieties have added at least half a billion dollars to the farmers' pockets each year. And the same kind of progress has been made with sugar crops. But while geneticists are working to hybridize new varieties of grains, nature is busy hybridizing new strains of rust and smut to attack the grains.

The research on dairy cattle has paid tremendous dividends. The first cow-testing association in the United States was started about 40 years ago. The farmers kept records of each cow's production, and they could quickly see which cows were paying for their board and which were not. These associations proved to be ideal places to put into practice what was learned from research. There are now over 1,000 of these Dairy Herd Improvement Associations. Last year the average production, as compared with 40 years ago, was almost 125 pounds more butterfat per cow. Over a million cows are in these associations.

But that's not all. Other farmers have applied these practices to their own herds. During the past 40 years there's been a gain of almost 50 pounds, in the average production of butterfat, for the 25,000,000 dairy cows outside the associations. And this means another billion pounds of butterfat a year.

DDT Development

As for DDT, the greatest value of DDT can't be measured in dollars and cents. In DDT we have the most powerful weapon ever possessed by man for the destruction of flies, mosquitoes, lice, and other insects that transmit human diseases. During the war without the use of DDT, there were many places in the world where our men could not have survived. And of course since the war, we've been using DDT against insects the farmer has to fight.

One of the most striking uses we've found for DDT on the farm is control of hornflies, stable flies, and the other flies that swarm around cattle in the summertime, such as the flies that used to make the old cow switch her tail and get it in the milk pail.

In order to find out how much the farmer really benefits by controlling flies on range cattle, the Department of Agriculture cooperated in a large-scale test with the State people in Kansas. A similar test was made in Florida on dairy cattle.

They found that in the range herd where the flies were controlled with DDT, the weight gain during the summer averaged 50 pounds more, per animal, than in a similar herd where no spraying was done to control the flies. In the Florida experiment, with the *dairy* cows, we found that the cows gave 10% to 15% more milk when the flies were controlled.

About $50,000 was spent in these experiments on DDT. There's already a profit of $10,000,000, with a possibility of reaching at least $100,000,000 every year.

The swine sanitation system is a simple practice now in use by most farmers who raise hogs. The pigs are farrowed on land that has not been used for hog pastures for at least a year. This keeps the little pigs from being infested with roundworms, and gets them off to a good start early in life.

About $25,000 was spent on this research, but it's worth $25,000,000 a year.

Parasite Control

Now there is a drug, phenothiazine, the most widely used of any drug for controlling internal parasites of livestock. This research cost us about $10,000, and every year farmers are getting back $10,000,000—in the form of thriftier animals that grow faster.

During the war, this drug treatment for sheep helped us over a critical shortage of surgical thread, made from sheep casings. But the casings from domestic sheep were so badly damaged by worms they couldn't be used—until the farmers began using phenothiazine. Agricultural research benefits not just the farmer, but the whole country, either directly or indirectly.

The best example probably is penicillin, but there's also the research on human nutrition—vitamins, minerals, proteins, and so on. The Department of Agriculture spent about $100,000 on that penicillin research.

They found out how to produce penicillin on a large scale, through mold fermentations. But they couldn't have done it in such a short time if Agriculture chemists hadn't already known a great deal about mold fermentations.

It is one of the best examples to illustrate the need for continuity in carrying out research. If the work on molds had been stopped a few years previous to 1940, we might never have been able to help the English doctors who came over that summer asking for help in producing this great disease fighter. And the world might still be waiting for penicillin. That adds thousands of human lives to the dividends from farm research, lives that can't be measured in dollars and cents.

The annual added farm income due to just these examples of agricultural research is over $2,000,000,000 each and every year. All this resulted from research investments that totaled over several decades only a few tens of millions of dollars at the most. And don't forget the human lives saved and the more contented fly-free cows.

Science News Letter, April 12, 1947

BIOCHEMISTRY

Protein Synthesis Seen

Traced with radioactive sulfur, protein synthesis was carried out in the laboratory. Methionine was used with living tissue to synthesize proteins.

➤ THE FIRST direct observation of protein synthesis outside the animal body has been achieved through the tools of atomic science.

Two University of California scientists reported this pioneering step in the application of radioactive substances to the study of growth, cancer and other biological processes associated with the building up of organic compounds in living systems.

Surprisingly, the advance was made with radioactive sulfur, which has been available to researchers on the Berkeley campus for a number of years. The technique of study will have its widest application with radioactive carbon 14, which was only recently released to scientists by the Manhattan District.

The two researchers, Drs. Harold Tarver and Jacklyn Melchior, placed living animal tissue slices in a solution together with methionine labeled with radioactive sulfur. Methionine is one of about 25 amino acids, which are sometimes called the building blocks of all life.

The liver slices were slowly dying, with a breaking down of protein into amino acids. But so long as they lived they were building up some new protein, using the discarded amino acids. This process was demonstrated by the finding of labeled methionine incorporated into the protein of the tissue slices.

Proteins are formed by the linking together in chains of various amino acids. Drs. Tarver and Melchior found that the radioactive methionine was incorporated into the protein by the formation of peptide bonds, which are the typical linkage between the amino acid molecules in all proteins. In this linkage a carbon atom of one molecule is linked to the nitrogen atom of another molecule.

The scientists succeeded in their experiments after failure to demonstrate true protein synthesis using radioactive cysteine, another sulfur-bearing amino acid.

Dr. Tarver, reporting to the *Archives of Biochemistry,* expressed the opinion that the study, applied with radioactive carbon, provides an unexcelled technique for the study of the formation of the all-important peptide bond. For the first time biochemists are able to come to direct grips with the problem of protein synthesis.

The technique will also enable Dr. Tarver and other scientists to study the differences between protein formation in different tissues, for example between normal and cancer tissue.

Its use with sulfur will be limited, since only methionine and cysteine, of the amino acids, contain sulfur. However, all the amino acids have carbon atoms.

Science News Letter, April 12, 1947

RADAR

Aluminum Kite Reflector Is Used for Radar Target

➤ AN INGENIOUS target for radar reflection is being employed in connection with work perfecting automatic equipment to direct gun-fire against aircraft with greater accuracy than used during the war. Westinghouse scientists are responsible.

The target is a box-kite radar reflector built of light balsa wood and aluminum foil. It is held aloft some 600 feet above the earth by an anchored five-foot helium-filled balloon. Aluminum is employed because it is an unusually good reflector of the ultra-short waves used in radar. This is one of the reasons that tiny V-shaped strips of this metal were scattered in the sky by American bombers to blind the aircraft from enemy radar eyes. This so-called "radar counter-measure" was known as "window."

The great advantage of a high-suspended target in the development work is that its field is clear of all obstructions. Radar reflections from targets near the earth are subject to interference from ground-reflections or others from tall buildings, trees and hills. When the gun-aiming device is more nearly perfected, airplanes will be used for targets.

Science News Letter, April 12, 1947

CEILOMETER—Army Air Forces instrument measures the height of clouds by throwing up a ray of ultraviolet light which is scanned by a photo-electric cell unit. When a cloud breaks the beam, a "trace" registers on the recording instrument. The ceilometer accurately gauges cloud heights up to 10,000 feet.

TEXTILES

Cotton Fabric Has Fibers Of Glass to Resist Fire

➤ BEAUTIFUL draperies that defy fire are now available from the looms of Plymouth Fire-Guard Fabrics. They are woven of a combination of noncombustible, very fine glass fiber and flame-proofed cotton yarn.

While these fire-resistant fabrics are suitable for homes, they are designed especially for hotels, night clubs, schools and other places where people congregate and where considerable fire hazard exists. The first installation is in a new dining room and in a cocktail lounge in a New York Fifth Avenue hotel.

The fabric has been approved for use in New York by the proper city authorities. Before approval it was tested with the gas flame from a Bunsen burner. Practically no burning continued after the flame was removed.

The new fabric is available in a wide range of colors, designs and shades. It can be dry-cleaned, do not stretch, and can be cut, sewed and ironed as easily as all-cotton fabrics.

Science News Letter, April 12, 1947

ASTRONOMY

Thirteen Scientists Start Trip to Observe Eclipse

➤ THIRTEEN scientists, all hoping for clear weather and not at all superstitious about the number in the party, have left by plane for Brazil. Their ultimate goal is an "eclipse town" near Bocayuva, Minas Geraes State, Brazil, about 400 miles north of Rio de Janeiro.

Although the sun will not be hidden by the moon until Tuesday, May 20, these astronomers and physicists of the Army Air Forces-National Geographic Society Expedition are making their way to Bocayuva in time to get their outstanding array of new and valuable instruments set up and in working order.

At the camp site, picked last August and now equipped with many modern conveniences, the total eclipse will last three minutes 48 seconds. It is near the center of the path of the eclipse, that extends from near Santiago, Chile, to Kenya Colony on the east coast of Africa. Here the chances of clear weather are better than at most points along the path of totality.

Weather, which must be accepted "as it comes" on the day of the eclipse, plays an important part in the success or failure of the expedition. Of the dozen projects which the scientists hope to carry out, only three can be accomplished, clouds or no clouds. Radio observation of the changes which take place in the ionized layers of the earth's atmosphere is the most important of these, the others being largely incidental projects.

The scientific leader of the expedition is Dr. Lyman J. Briggs, chairman of the research committee of the National Geographic Society and retired director of the National Bureau of Standards. He and one or two other scientists will leave for Brazil at a later date.

Science News Letter, April 12, 1947

MEDICINE

Cancer Cells Are Not Sticky Which Makes Travel Easy

➤ SCIENTISTS have discovered why cancer cells can spread so easily and invade other parts of the body.

It is because they are not sticky, and thus can break away and travel.

Normal muscle, bone and brain and skin cells adhere to each other more firmly and can't roam around.

The new facts may explain some of the mysteries of metastasis, as the doctors call this disastrous spreading of malignant cancer cells. Dr. Dale Rex Coman of the University of Pennsylvania Medical School made the experiment, reported in *Science* (April 4).

Two of a pair of cancer cells can be pulled apart by one-third the force necessary to tear apart two normal skin cells. The stickiness of skin tumors that are not cancers is closer to that of normal skin cells.

The decreased stickiness, or adhesiveness, of cancer cells which makes it possible for each of them to strike out on its own is due to low content of calcium.

Once a cancer cell gets free of its neighbor cancer cells, it can ooze into surrounding tissues like an ameba, the one-celled organism every high school biology student peers at through a microscope. Amebae, cancer cells, and normal scavenger cells of the body move by extending little finger-like edges and then squirming themselves up to meet the new position in line with the finger.

The cancer cells may be helped in their progress to new parts of the body by a chemical which may act on the cement substance between cells to open a space for the cancer cell invasion. This chemical, called a spreading factor, is hyaluronidase.

Science News Letter, April 12, 1947

IN SCIEN

MEDICINE

BCG Vaccine Against TB To Be Tested in Georgia

➤ COLUMBUS, Ga., and surrounding Muskogee County have been selected by the U. S. Public Health Service as the first community in which BCG vaccination against tuberculosis will be started as part of a long-range study program.

Preliminary tuberculin testing of the 16,000 children in the city and county schools is now under way. Following the tests, those children who show no sign of having been infected with tuberculosis germs will be given the vaccine which should protect them against the disease. The vaccine will be given to both Negro and white children when approval has been secured from their parents and physicians.

BCG was developed in the early part of the century by two French scientists, Albert Calmette and Camille Guerin. It is a strain of bovine TB germs which have lost their power of causing disease but are able to induce immunity to it.

Science News Letter, April 12, 1947

BIOCHEMISTRY

Date Tree Pollen Contains Chemical Like Sex Hormone

➤ SOMETHING having the same physiological effects as the female sex hormone has been discovered in the pollen of the date tree by two Egyptian scientists, Dr. Ali Hassan and Dr. M. Hassan Abou El Wafa of Fouad I University in Cairo. They report their results in *Nature* (March 22).

An extract prepared from the pollen was injected into laboratory rats. At the same time, ordinary female sex hormone was injected into another set of rats. Both sets responded with the same physiological reactions.

Although the substance has not yet been obtained in pure form for analysis, preliminary physical and chemical tests indicate that it is closely similar to sex hormone extracted from animal sources.

It is interesting to note that pollen, from which this female sex hormone has been extracted, is the male element in plant fertilization.

Science News Letter, April 12, 1947

PHYSICS

Non-Glare Rear View Mirror to Aid Drivers

➤ A NON-GLARE rear-view mirror, that will not annoy following drivers at night with dazzling reflections, is the invention on which W. H. Colbert of Brackenridge, Pa., and W. L. Morgan of Columbus, Ohio, have been granted patent 2,418,335, which they have assigned to the Libbey-Owens-Ford Glass Company. High reflecting power in rear-view mirrors is unnecessary; the inventors reduce the reflectivity of theirs by chemically spattering it with minute spots of lead sulfide.

Science News Letter, April 12, 1947

ARCHAEOLOGY

Shensi Pyramid Estimated To Be 2,000 Years Old

➤ THE GIANT pyramid reported discovered by an American aviator flying over Shensi province in China is in a land of pyramids, the heart of ancient Chinese civilization.

If the pyramid is located by exploring parties on the ground, it will probably never rival the famous pyramids of Egypt as a tourist sight. The Chinese pyramids of that region are built of mud and dirt and are more like mounds than the pyramids of Egypt, and the region is little-travelled.

American scientists who have been in the area suggest that the height of 1,000 feet, more than twice as high as any of the Egyptian pyramids, may have been exaggerated, because most of the Chinese mounds of that area are built relatively low.

The location, reported 40 miles southwest of Sian, is in an area of great archaeological importance, but few of the pyramids have ever been explored. Scientists who have sought to excavate in the region have had difficulties with the local authorities. Like the pyramids of Egypt, it is expected that the mounds of this area have been looted for centuries by the natives.

Pyramids, such as the one reported by the American flyer, are the tombs of ancient peoples, with the biggest pyramids containing the tombs of the kings or emperors.

In the same area but east of Sian, ancient capital of several Chinese dynasties, is the pyramid believed to be the tomb of Ch'in Shih Huang-ti, the emperor who built the Great Wall of China some 2,200 years ago.

Best estimates are that the newly "discovered" pyramid is at least 2,000 years old.

Science News Letter, April 12, 1947

MEDICINE

Vitamin B Treatment Aids Victims of Tick Disease

➤ DEATHS from Rocky Mountain spotted fever, a tick disease, may be wiped out by modern treatment including doses of one of the B vitamins, para-aminobenzoic acid, Dr. Samuel F. Ravenel, of Greensboro, N. C., declared in the Journal of the American Medical Association (April 5).

Rapid recoveries occurred in four out of five patients for whom Dr. Ravenel used the new treatment. The fifth patient also recovered, but almost died due to what Dr. Ravenel terms "improper handling" of the case as regards the use of para-aminobenzoic acid.

"The astonishing thing about these patients," Dr. Ravenel states, "was the amazing speed with which the temperature dropped, the rash faded and recovery ensued as soon as adequate concentrations of para-aminobenzoic acid in the blood were achieved."

One boy who might have been expected to be extremely sick for two to three weeks had a normal temperature and rapidly fading rash on the sixth day of treatment. An exceedingly ill, delirious child who, before the days of para-aminobenzoic acid treatment, would have been expected to have high fever for two weeks, had a normal temperature and rapidly fading rash on the fourth day of treatment.

The drug was given by mouth in a solution of sodium bicarbonate. A preparation of it that could be given by hypodermic injection at the start of treatment in unconscious or vomiting patients would be extremely helpful, Dr. Ravenel points out.

Para-aminobenzoic acid alone is not the "sole answer" to the problem of treating Rocky Mountain spotted fever patients, Dr. Ravenel points out. Supportive treatment in the form of fluids, other vitamins and salts should be given. Possible toxic effects of the drug and complications of Rocky Mountain spotted fever should be watched for.

Science News Letter, April 12, 1947

SOIL CONSERVATION

Rose-Bordered Fields Make Good Erosion-Check

➤ FARMERS' FIELDS may be edged in pink, in the Junes of years to come. Hardy, fast-growing, tough-stemmed roses are recommended instead of wire fences by the U. S. Department of Agriculture. Added beauty will come from the fact that in new erosion-checking field layouts the boundaries follow the curving contour lines of the hills, instead of running intolerantly straight and crossing at right angles, as wire fences too often do.

Most suitable species for hedge purposes, say Department botanists, is the multiflora rose. It is as hardy as the proverbial iron poker, and puts down strong, soil-retaining roots. Its stems are 20 times more spiny than barbed wire; they grow to a height of six or eight feet and never require pruning.

In addition to their dual principal job of keeping stray animals out of the fields and the soil in, rose hedges will also serve as shelter for birds and smaller animals. The rose hips, though scanty-pulped, have at least a minor food value: they are rich in vitamin C and are good for jelly-making.

Science News Letter, April 12, 1947

ENGINEERING

B-29 Is Flying Laboratory For Gas Turbine Testing

➤ AN ARMY bomber, a B-29 Superfortress, has found a peacetime job—it is now a flying laboratory, in use in Schenectady for altitude testing of aircraft gas turbine engines.

The use of flying laboratories has proved to be a safe and expedient way of conducting tests under altitude conditions, General Electric engineers stated, and more economical than establishing altitude wind tunnels. Their use has been highly satisfactory, they declare.

They explained that the powerful jet plants are installed as an auxiliary unit of the flying laboratory instead of a substitute engine. Flying laboratories in one type of plane or another have been used by General Electric since 1942. One great advantage over wind tunnel methods is that there is space for design engineers on the plane to observe operations under actual flight conditions. They also are provided with a means of learning problems attendant to flying.

Science News Letter, April 12, 1947

ENGINEERING

Coal Flows to Furnace

Powder-fine coal will power locomotives and heat homes. Special furnace and engine must be used but operating costs for locomotives will be lowered.

By A. C. MONAHAN

➤ COAL HAS WON another point in the battle of fuels. Coal as fine as powder, pulverized by bursting at a nozzle end, will power two new coal-burning gas-turbine locomotives and will be used in home heating. It flows to the firebox through hose or tube, requiring no more handling than oil. It burns almost completely.

The principal competitors of coal are fuel oil and gas. In favor of coal, in the battle of fuels, are its abundance, relative cheapness and wide distribution. In favor of fuel oil is its easy handling. American coal reserves are great enough to last for many centuries. Natural oil reserves face relatively early depletion. Manufactured products from coal and oil shale will supplement petroleum production, but their cost will be an important factor.

To keep coal in the top place as a fuel, two requirements must be met. One is to develop methods of combustion that will convert the full energy in the coal to useful work; the other is to develop coal-handling methods as easy as those employed in handling fuel oil and gas. This finely pulverized coal may furnish the answer to both.

Tests Passed

Face-powder-fine coal has successfully passed laboratory and pilot-plant tests, and is to be tried out in both building heating and in power plants. The heating experiments will be tested by a commercial company in Baltimore in heating homes and office buildings. The power tryout will be in two giant railway locomotives now under construction. The locomotives will be powered by gas-turbine engines, but these gas-turbines burn coal instead of the customary liquid fuel.

Construction of a coal-burning gas-turbine engine does not present especially difficult problems in itself; the problem is putting an automatic system on the locomotive to crush, dry and pulverize the fuel and deliver it into the combustion chamber. Another problem is the removal of the non-combustible particles in the combustion products, the so-called fly-ash.

Coal, of course, can be converted in large part into combustible gases by long-used methods, and the gases used to power the gas turbines. This, however, is an expensive process and one that can not easily be adapted to use on a locomotive. The important new development includes a method of pulverizing lump coal in the locomotive, delivering it into the firebox, and insuring complete combustion.

The two coal-burning gas-turbine locomotives being built, which will be on the rails in 1948, carry all necessary equipment for converting ordinary lump coal into power. They will load with coal at ordinary railroad coal chutes. Wayside stations to deliver pulverized coal are not thought advisable because their use would confine the new locomotives to trackage where the stations were erected. These locomotives will also have storage capacity to hold the fly-ash until proper disposal sites are reached.

The process of pulverizing the coal on these locomotives is of particular interest. Coal can be pulverized mechanically, of course, but the process is not satisfactory for use on locomotives, largely because of space limitation. The method that will be used is the so-called air-operated "coal atomizer" system.

It is a relatively simple process, resembling one used in the preparation of certain puffed breakfast cereals. The coal atomizer was first used, it is claimed, at the Institute of Gas Technology, Chicago, to produce finely pulverized coal for gasification. It is a device that requires about one pound of air for a pound of coal, the air being under pressure about 80 pounds per square inch higher than the combustor pressure.

Development of Locomotives

The development of the coal-burning gas-turbine locomotives is under the Locomotive Development Committee of Bituminous Coal Research, Inc., in Baltimore. The director of research is John I. Yellott, with Charles F. Kottcamp as as-

FLOWING COAL—"Coal atomizer" and attrition chamber are being examined by John I. Yellott, director of research, and W. N. McDaniel of the Locomotive Development Committee of Bituminous Coal Research Laboratory at Johns Hopkins University sistant. The committee itself is composed of the chief executives of six leading coal-burning railroads and three major coal producers. It is logical that these interests constitute the membership; the railroads and the coal industry are each other's best customers.

The coal atomizer consists of a nozzle through which is passed air under pressure and coal that has been crushed and dried. As the coal particles leave the nozzle, and the pressure is reduced, they burst with internal explosions which take place when the air entrapped within the pores of the coal is suddenly relieved of pressure. Because of its simplicity and lightness, the device is well suited for use on the locomotives, and it is the best coal-pulverizing method yet developed.

Problems of Burning

After pulverization, the fuel passes on to the combustion chamber. The actual burning of coal under pressure presented special problems of its own. In this, the Battelle Memorial Institute in Columbus, Ohio, made extensive contributions. This research and testing laboratory, serving industry, is among several institutions that played a part in the development of equipment for the new locomotives. Included also are the Johns Hopkins University, Purdue University, the Institute of Gas Technology in Chicago, and several makers of gas-turbine engines and locomotive builders.

The Battelle combustion chamber is the so-called vortex type. Air, laden with the finely pulverized coal, is driven into a cylindrical tube through a series of vanes which causes the air to spin vigorously as it passes toward a centrally located outlet. The action produces a rotating fuel bed suspended in rapidly rotating air. Ignition is started by a small pilot gas flame, which can be turned off once burning is under way.

IGNITION TEST—Test to determine the possibility of spontaneous ignition of coal when stored under pressure is witnessed by Mr. Yellott and his assistant director.

The removal and disposition of the fly-ash from the products of combustion are of the utmost importance. If the fly-ash passes through the turbine vanes, serious abrasion is caused. Under tests already made, small cyclone separators made by the Aerotec Company and the Thermix Engineering Company, both of Greenwich, Conn., produced satisfactory results.

Provisions for Ash

Special compartments to hold the removed fly-ash will be provided on the locomotives. If the ash were allowed to discharge into the air from the speeding locomotive, it would be gathered up by the air-conditioning systems of the following passenger cars and would clog up the equipment. If compacted and discharged as pellets, a hazard would be created.

This revolutionary type of locomotive, which will use a plentiful type of fuel, is expected to lower main-line operating costs to one-half that of diesel-electric power plants, and will cost about the same to build. It is a great saver on lubricating oil, and gas-turbines consume no water.

The commercial building-heating tryout in Baltimore, in which finely pulverized bituminous coal will be used as fuel, does not plan to sell coal but to sell heat, on an annual contract. The necessary furnaces and equipment will be operated by the company and not by the customer.

After installations are made, the company will do all maintenance and servicing. The pulverized coal will be delivered as needed in tank trucks, like oil, and run into the building through hose. The powdery ash resulting from the combustion will be taken away by the fuel delivery trucks.

For burning the pulverized coal, there is a special furnace, although some old furnaces can be converted, it is claimed. There is a storage tank for fuel, and one for ashes and equipment for air pressure. The house-size special furnace is a vertical sheet-metal cylinder lined with refractory material. Top-mounting of the powdered coal-burner provides for down-firing, after ignition by a gas pilot and sparkplug. The entire system is clean, and gives smokeless combustion.

Science News Letter, April 12, 1947

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Do You Know?

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Wood rots through attack of fungi or organisms; wood weathering, on the other hand, is a slow process of wearing away due to fiber expansion and shrinkage caused by changing moisture content.

The production of metal *hydrides* is an increasing industry in America, the products being used principally in metallurgy; calcium hydride was used during the war to generate hydrogen for instrument-carrying balloons.

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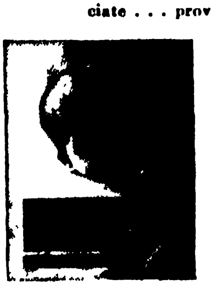

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VOLCANOLOGY

Iceland's Hekla Among Most Active Volcanoes

See Front Cover

➤ HEKLA, the "back gate to hell," as it was called in medieval Iceland, is one of the world's most active volcanoes. Its recorded history begins in the year A. D. 1114, when there was a rain of sand in the winter. Although the main crater has been on a vacation since 1878, there was an eruption through a subsidiary vent in 1913.

Hekla's greatest recorded eruption occurred just over a century ago, when the mountain disgorged lava and spewed up hot ashes over a period of seven months. Total volume of the ash was estimated at nearly half a billion cubic yards. Some of it, borne on winds in the upper air, was carried as far as western Germany.

The worst danger from Iceland's volcanoes is not the direct threat of lava rivers and ash showers, but the chance of the hot lava coming into contact with snow and ice fields and melting them into disastrous floods.

Science News Letter, April 12, 1947

ASTRONOMY

New Ninth Magnitude Comet Spotted Near North Star

➤ A NEW COMET is in the vicinity of the north star. Of the ninth magnitude, it is too faint to be seen with the naked eye or binoculars, but may be picked up with a small telescope. The comet will be named after its discoverer, Dr. Antonin Becvar, director of the new modern astrophysical observatory near Skalnate Pleso (Rocky Lake) in Czechoslovakia.

Spotted in the constellation of Draco, the dragon, the diffuse object moved rapidly across the northern sky into the constellation of Camelopardus, the giraffe. Astronomers and amateurs with telescopes available, both in this country and in Europe, are anxiously watching its flight. Comet Becvar, first spotted on March 27, was located several days later at the Students' observatory of the University of California at Berkeley.

First word of the comet was cabled by Dr. Elis Stroemgren of Copenhaven University Observatory, world astronomical information bureau, to Harvard College Observatory, clearing house for astronomical news in the western hemisphere.

Late last May a sixth magnitude comet was found by another keen-eyed astronomer in Czechoslovakia, Ludmila Pajdusakova, also of this observatory. The comet was independently discovered by David Rotbart, Washington business man, so is known as the Pajdusakova-Rotbart Comet.

Science News Letter, April 12, 1947

AGRICULTURE

Fertilizer Does Not Kill Soil's Useful Earthworms

➤ SPRING gardening note:

You needn't hesitate about putting fertilizer on your soil for fear of killing the useful earthworms in it.

The rather widespread belief that fertilizers harm earthworms has been tested at the New Jersey Agricultural Experiment Station and found erroneous.

Samples of soil were taken from a plot of land on which a lespedeza crop had been grown for five years, with heavy applications of fertilizer each year. An earthworm census was taken from these samples, and the results interpreted in terms of an acre.

The count came out as approximately 1,320,000 earthworms per acre, all in the top 18 inches of soil.

Science News Letter, April 12, 1947

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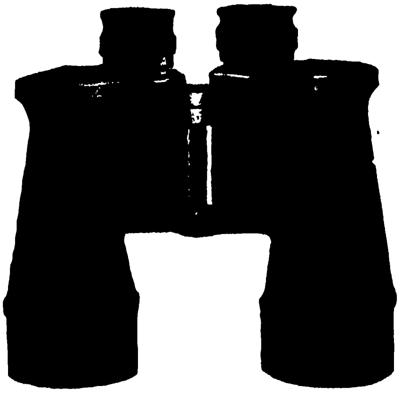

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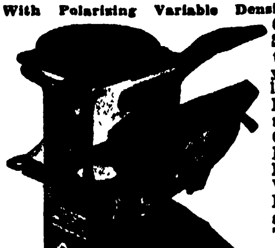

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WILDLIFE

NATURE RAMBLINGS

by Frank Thone

Too Many Deer

➤ DEER, not so long ago a worry to conservationists because of their growing scarcity, are now a cause of headaches to wildlife administrators because of the very opposite condition—there are getting to be too many of them. A survey of the deer over-population problems in this country, by Prof. Aldo Leopold, Lyle K. Sowls and David L. Spencer of the University of Wisconsin, is published in the March issue of the *Journal of Wildlife Management.*

There are deer in 47 of the 48 states of the Union, the report states, and 30 of these states report deer trouble of one kind or another. Even prairie states like Nebraska, Iowa and Illinois have spots where deer are too abundant for either their own good or the farmers' comfort.

Biggest deer-problem areas, however, are in natural deer country: northern Wisconsin and Michigan, New Hampshire, New York and Pennsylvania, south central Texas and central Utah. Smaller deer-trouble spots dot the whole of the West. The only section where deer are present, yet do not make trouble for someone, is the Southeast.

Deer difficulties are chronic in some areas, but in most of them the animals stage, at irregular intervals, sudden growths in population which the three researchers term "irruptions". Largely freed of the regulating influences of such predatory animals as timber-wolves and pumas, and protected by both game laws and local sentiment, they feed and breed to a point where the authorities charged with their welfare are unable to cope with their numbers.

During such an irruption, the animals crop their best browse-plants closer and closer, finally wiping them out over considerable areas. Other plants, not relished by deer, take their place. Finally mass starvation ensues, frequently triggered by some weather disaster such as a heavy glaze storm or a prolonged blizzard. This reduces the deer population—but in the hard way.

So thoroughly has the "spare-the-deer" campaign of the early part of the century worked, that now it often works the wrong way. Sportsmen will not shoot does even when the welfare of the herd demands the removal of some of them. Indignant local sentiment has been known to prevent selective killing by wildlife administrators, even when mass starvation lay immediately ahead.

The only effective education to the new state of affairs, the three researchers conclude, is to take groups of interested citizens to over-browsed areas where deer are starving, and let them actually see for themselves.

Science News Letter, April 12, 1947

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ORNITHOLOGY

Radar Waves' Effect On Birds' Direction

➤ DO RADAR WAVES upset birds' sense of direction? Dr. R. B. Roberts, physicist with the Carnegie Institution of Washington, is wondering.

During the war, he was at a point on the Virginia coast, conducting experiments that involved the use of radar. A number of times, when he and his companions saw a well-arrayed flock of wild ducks flying along, they gave them a "squirt" of radar rays. The ducks' orderly formation would break up and the birds would fly wildly in all directions.

Dr. Roberts isn't certain that the radar did it, because there were other possible disturbing factors at work in the same area, such as small-caliber gunfire making a lot of noise. So he would like to hear from anyone else who had a similar experience with radar and flying birds.

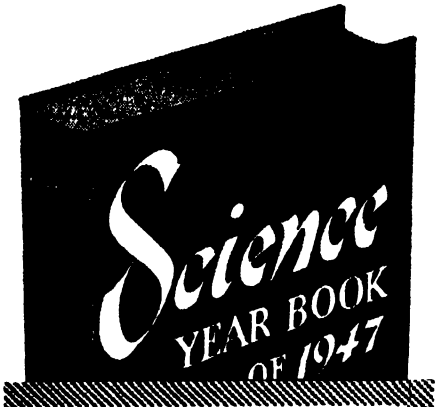
Science News Letter, April 12, 1947

HORTICULTURE

Chemicals Can Prevent Cracking of Cherries

➤ CRACKING of cherries after rains, through gorging with too much water, can be prevented in either of two ways, Prof. W. L. Powers and W. B. Bollen of Oregon Agricultural Experiment Station have discovered. Inclusion of a little anhydrous copper sulfate in the protective spray with which the trees are dusted will do it, and so will the application of about one pound of borax per tree, with the fertilizer. Similar good results have been obtained with prunes, they state, in reporting their results in *Science* (March 28).

Science News Letter, April 12, 1947



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Books of the Week •

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THE ATOMIC STORY— John W. Campbell —*Holt,* 297 p., illus., $3. Written with humor and clarity by an author who believes that nuclear physics is a perfectly simple and natural thing.

BANTING'S MIRACLE— Seale Harris—*Lippincott,* 245 p., illus, $3. A biography of a great man whose life was an inspiration to everyone, this tribute to the discoverer of insulin celebrates the twenty-fifth year of its use to restore diabetics to useful life.

THE CHEMICAL COMPOSITION OF FOODS —R. A. McCance and E. M. Widdowson —*Chemical Pub.,* 2nd ed. rev., 156 p., $3.75. A revised up-to-date edition of a British text which American nutritionists and dietians may find useful.

DISEASES OF THE NOSE AND THROAT— Charles J. Imperatori and Herman J Burman—*Lippincott,* 3rd ed, 576 p., illus., $12. The relation of vitamin deficiencies to mouth health and the use of penicillin and sulfadiazine are among new features in the latest edition of this textbook.

THE 4 FORESTS AND THE FUTURE OF THE SOUTH—I. F. Eldredge—*Chas. Lathrop Pack Forestry Found.,* 65 p., illus., $1. A thought-provoking discussion of forest types in the South, their relation to industrial advance, and the necessary continuous application of good forestry measures to ensure their long-term usefulness.

THE LIGHT METALS INDUSTRY—Josephine Perry—*Longmans,* 128 p., illus, $2. An excellent introduction to the history, processes of manufacture, and methods of fabrication of aluminum and magnesium, this survey also outlines present research and future trends.

LILIES FOR EVERY OCCASION—Isabella Preston—*Orange-Judd,* 160 p., illus., $2. Written for amateurs, preparation of the soil, planting the bulbs, and general care are described in detail. Its aim is to help gardeners grow as many species as possible and even to raise their own varieties from seed.

LOGIC FOR THE MILLIONS—A. E. Mander —*Philosophical Lib.,* 206 p., $3. Textbook to teach skilled thinking; with practical examples, it shows how to avoid vague, muddled and feeble thinking, writing, or speaking.

MEET THE ATOMS—O. R. Frisch—*Wyn,* 226 p., $3. With an introduction by Lise Meitner, this book explains this subject simply. It is an explanation of the background of experiment and discovery which led to the release of atomic power.

MEN AND THEIR MOTIVES—J. C. Flugel—*Int. Univs. Press,* 290 p., $5. Series of essays on the social significance of personal attitudes as seen from the author's psychoanalytic viewpoint.

RECENT PROGRESS IN HORMONE RESEARCH, Vol. I—Gregory Pincus, ed.—*Academic Press,* 399 p., illus., $7.50. These collected essays, Proceedings of the Laurentian Hormone Conference, deal with neurohumoral relationships, chemistry and physiology of adrenal hormones, role of hormones in metabolic processes, and aspects of clinical endocrinology.

RECONVERSION FOR PEACE—Illinois Natural History Survey, Div. of Registration and Education—*Pub. by the Survey,* 36 p., paper, free. A statement of alterations in the state program to serve best the purposes of peace as well as an outline of research programs under way.

RUSSIAN-ENGLISH TECHNICAL AND CHEMICAL DICTIONARY—Ludmila I. Callaham —*Wiley,* 794 p., $10. Containing over 80,000 terms in a wide range of industries and professions, this book fills a long-felt need.

SCIENCE PLANS FOR TOMORROW; OUR WORLD OF SCIENCE, BOOK VIII—G. S. Craig and John Urban—*Ginn,* 448 p., illus., $1.72. Planned for elementary schools, this text covers The Story of the Stars, This Restless Earth (volcanoes), Understanding the Weather, Co-operation for Better Health, Science and America's Future, and other topics written in a manner which challenges the imagination.

SCIENCE THROUGH EXPERIMENT: A General Science Workbook—Charles H. Lake, Louis E. Welton, and James C. Adell—*Silver,* 264 p., illus., $1.24. Divided into 25 units, this text for junior or senior high schools applies learning by doing to general science.

A SURVEY OF HUMANISTIC WORK IN PROGRESS ON THE PACIFIC COAST—Hugh G. Dick—*Am. Council of Learned Socs.,* Bulletin 39, 100 p., paper, 25 cents. For this survey, the humanities include studies in language, literature, history, and philosophy, and in art, music and anthropology viewed historically; textbooks, dissertations and short essays are excluded.

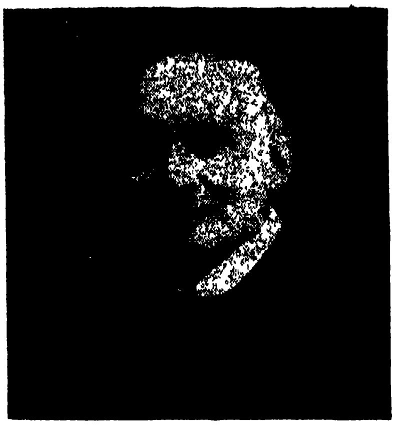
THE TECHNOLOGY OF ADHESIVES—John Delmonte—*Reinhold,* 516 p., $8. Because of the growing interest in the structural applications of plastics and composite laminated structures, this discussion of developments in adhesives is particularly timely.

THE UNCONQUERED PLAGUE; A Popular Story of Gonorrhea—Harry Wain—*Int. Univs. Press,* 119 p., paper, $1.50. This frank discussion of an age-old plague emphasizes the fact that with present day advances in new drug therapy and an enlightened public health program this crippler of mankind may be eliminated.

WRITING SCIENTIFIC PAPERS AND REPORTS —W. Paul Jones—*Wm. C. Brown,* 125 p, paper, $2.50. This clear discussion of how to present information, although written for engineering students, will be of value to any student who writes reports.

YOU AND THE UNITED NATIONS—Lois Fisher—*Childrens Press,* 40 p., illus., paper, 60 cents. Cartoons argue the idea and necessity of peaceful cooperation in "one world"; however, a few sensible explanations are included. Written for teenagers.

Science News Letter, April 12, 1947



ALFRED NORTH WHITEHEAD

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Science News Letter, April 12, 1947

✽ *BUILT-IN home radio and sound system consists of four major parts: a portable tuner, an amplifier, a record player and one or more speakers. The small tuner, plugged into outlets in any room wired for it, is all that is visible because all other units are concealed in the walls or in other suitable places.*

Science News Letter, April 12, 1947

✽ *POWDER to mix with any paste wax, to make polishing easy, is a chemical preparation that glazes and hardens the wax quickly. The wax is applied as usual and then, while still moist, is sprinkled with the powder and rubbed to a finish with only a few light strokes.*

Science News Letter, April 12, 1947

✽ *HANDBAG, that looks like an archer's target, is made of concentric circles of coiled colored plastic. The colors, made in the plastic, can be refreshed with a damp cloth. A zipper, shown in the picture, opens almost half-way round the circle.*

Science News Letter, April 12, 1947

✽ *BABY ENGINE for model airplanes weighs 22 ounces and develops one-half horsepower. It is an exact scaled model of a full-sized airplane engine weighing 219 pounds that develops 85 horsepower. With tests now completed, this six-inch midget will be available next year.*

Science News Letter, April 12, 1947

✽ *FIBER GLASS bodies on three-wheeled electric runabouts, suitable for use in factories or at pleasure resorts, are molded in one piece, the material used being layers of fine glass fiber bonded together with a resin. These bodies are light in weight, strong, durable, and can withstand bumping.*

Science News Letter, April 12, 1947

✽ *NEOPRENE soles for sport shoes are claimed to be superior to natural crepe rubber soles. They wear longer, have little tendency to spread, and are highly resistant to oils, gasoline and heat.*

Science News Letter, April 12, 1947

Question Box

AGRICULTURE

How has DDT increased the income of dairies? p. 230.

What is the greatest weapon for destroying mosquitoes, flies and lice? p. 230.

ANATOMY

What causes baldness? p. 228.

ARCHAEOLOGY

Of what are the Chinese pyramids of the Shensi region made? p. 233.

ASTRONOMY

Where was a new comet discovered? p. 236.

BIOCHEMISTRY

How was protein synthesis carried out in the laboratory? p. 231.

ENGINEERING

What are the two requirements coal must meet to keep top place as a fuel? p. 234.

MEDICINE

How do cancer cells travel? p. 232.

How has fertility been restored to female mice? p. 229.

What can be used for shots in the arm besides needles? p. 229.

Why are people alcoholic? p. 228.

MINING

What are the two greatest causes of deaths in mines? p. 227.

What is the best preventive of explosions in mines from coal dust? p. 227.

WILDLIFE

What makes deer a problem? p. 238.

Pictures: *United States Steel Corporation, p. 227; U. S. Army Air Forces, p. 231.*

Where published sources are used they are cited.

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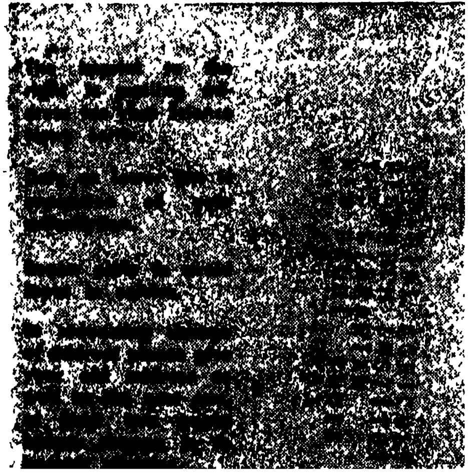

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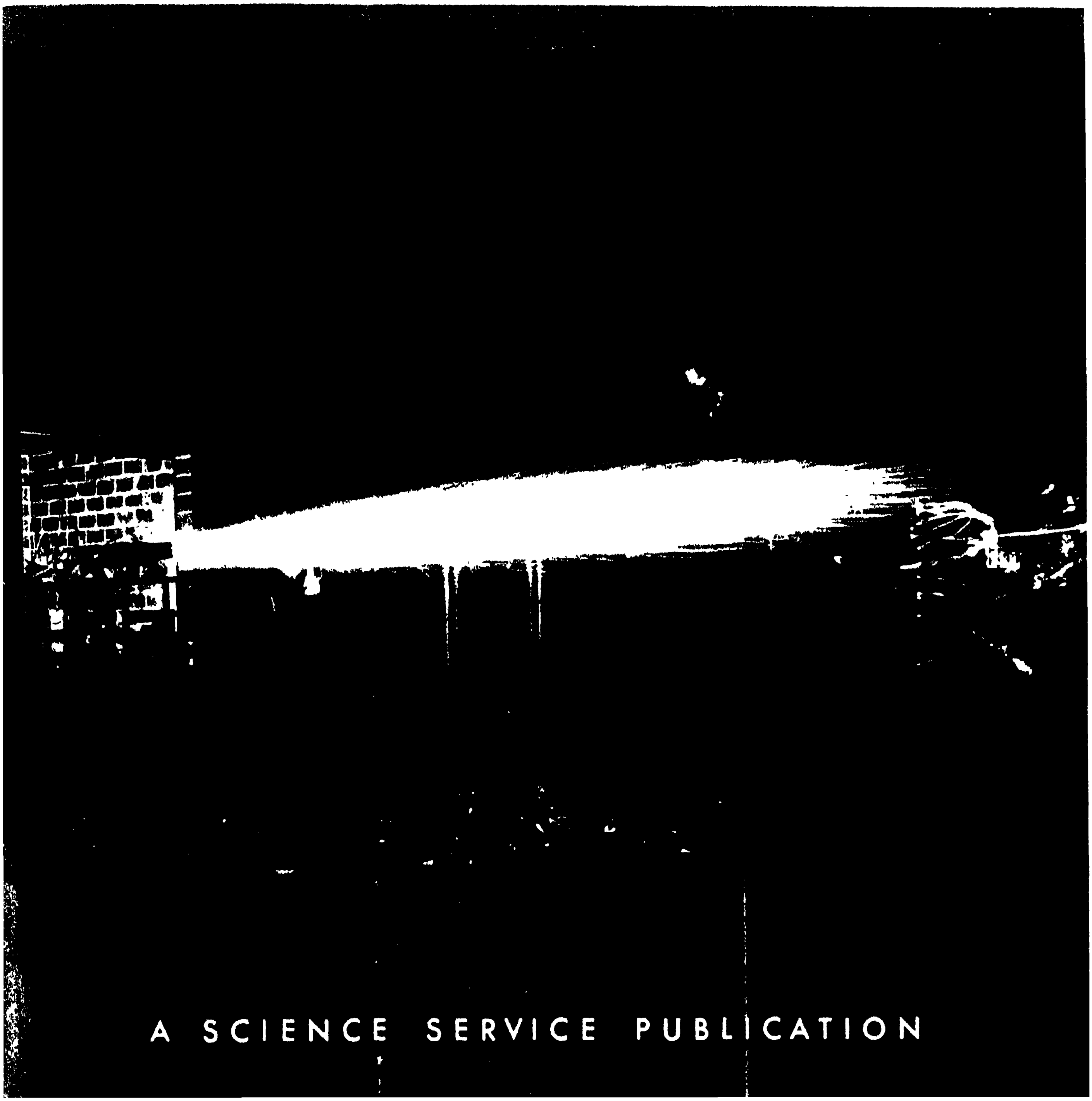

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CHEMISTRY

Mysterious Explosive

Ammonium nitrate, so harmless that it can be hammered, and so incombustible that it does not burn, can explode to burn city.

➤ CHEMICAL mystery, unsolved after decades of investigation, is why ammonium nitrate explodes violently as it did in the ship at Texas City, yet won't explode when hammered or penetrated with high power rifle bullets.

The chemical villain in the Texas disaster is a harmless-looking white salt. It is not even classed as an explosive. It is usually safe to handle. A hundred million pounds are manufactured each year for fertilizer or explosives use.

Only infrequently does ammonium nitrate go off with great violence, as it did at Texas City and as it did at Oppau, Germany, in 1926.

As a leading explosive expert put it: "When ammonium nitrate explodes, it is always mysterious."

Always Mysterious

Often slightly wet from moisture it has drawn from the air, the white crystals cake like table salt on a humid summer day. The caked masses often become so hard that workmen use iron picks and shovels to break them up. They pound the lumps with hammers. As a demonstration of the chemical's safety, they have even shot high-powered rifle bullets into a mass of the salt. Very special kinds of detonators are required to set off blasting powder made of ammonium nitrate, and no amount of shock is known to have caused the pure salt, uncontaminated with any other material, to explode.

Neither will ammonium nitrate burn. This is expected from chemical theory, for burning is, in general, combination with oxygen and the salt already contains a considerable quantity of that element. Even when heated to the ordinary degree in chemical processes it will take up no more.

It is another story, however, when the ammonium nitrate is contaminated with burnable material. Organic matter, chips of wood from packing boxes, fuel and lubricating oil dripping from carelessly closed containers, any of the combustible waste and dust constantly underfoot, mixed with the harmless-looking salt, make a mixture where conditions are just right for a fire.

Organic material is made largely of carbon, often combined with hydrogen into forms which need to be heated only slightly to catch fire and burn in the oxygen of the air. We are so used to the fact of fire that we seldom think of the dangerous flammability of common materials.

Ammonium nitrate is, in comparison with most materials, not flammable by combining with the oxygen of the air. But when mixed with material that is flammable it helps combustion by giving up its own oxygen to help the fire along.

Exactly what happens when ammonium is heated to a high temperature is still unknown, for when it "lets go" the whole mass explodes and there are seldom any survivors to report what happened. By violent rearrangement of the molecules, huge stores of energy are let loose in an instant. Flame and hot gases spread destruction to other burnable materials, and a holocaust like that in Texas City is the result.

Compared to War

It is natural to compare the destruction to war damages, for essentially the same chemistry is involved. The ammonium nitrate which blew up the French ship Grand Camp was probably salvaged from war-time ammunition. For military use, the hazards of explosive material have been purposely increased. The energy-giving salt has been mixed with unstable chemicals to make explosives still more dangerous.

A question often asked is, "How does this explosion compare with that of the atom bomb?"

To the explosives chemist, who measures time in much shorter units than anyone else, the two types of explosion are very different. The huge vertical wall of blast pressure that moved out from Bikini was quite unlike the slower-moving wave set off by those types of ammonium nitrate explosives which have been thoroughly studied. Frequently used in coal mines for its effect in "heaving" rather than shattering coal, ammonium nitrate, making up as much as 95% of some blasting powder, is considered slow and safe, as explosives go.

For the future, explosives experts feel that no additional regulations are necessary, so far as pure ammonium nitrate uncontaminated with organic material is concerned. Stock of ammunition being reworked for agricultural use must always present more hazard than the newly formed chemical which has never been mixed with explosive material. Care in handling the salt will always be needed because, as one chemist put it, "wood that has been soaked in ammonium nitrate burns very nicely."

Science News Letter, April 26, 1947

BACTERIOLOGY

Bacteria Corrode Concrete By Producing Sulfur-Acids

➤ BACTERIA that corrode solid concrete with sulfur-containing acids produced by their secretions have been discovered by Dr. C. D. Parker of the research laboratories of the Melbourne and Metropolitan Board of Works, Australia. He has named the new species *Thiobacillus concretivorus,* which translates as "sulfur-bacillus that eats concrete." It makes a good deal of trouble in concrete sewer pipes.

Actually, the bacteria do not literally eat the concrete; they feed on the complex mixture of decaying materials in the sewage, as do many other kinds of microorganisms. Sewage contains proteins and related compounds; breakdown of these yields sulfur compounds of varying degrees of complexity. It is on these sulfur compounds that some of the bacteria feed, for which reason they have appropriately been named thiobacteria or sulfur-bacteria.

One thing puzzled Dr. Parker at first: his concrete-eaters require a rather highly acid medium in which to live, and the surface of fresh concrete is quite definitely alkaline. He discovered upon further investigation that the way was prepared by other bacteria, operating in two stages. First came a group of mixed bacteria that could tolerate the concrete's alkalinity, then one already-known species, *Thiobacillus thioparus,* which could tolerate some alkalinity and also live under increasingly acid conditions. Finally, the newfound concrete-eaters took over at a higher degree of acidity, increasing it to a point where the acids are able to corrode the concrete.

Dr. Parker has reported his discovery to *Nature* (March 29).

Science News Letter, April 26, 1947

1 JUL 1947

MEDICINE

Penicillin Prevents Syphilis

Mold chemical acts as a prophylactic agent against germs before the disease develops when injected in rabbits. More research is necessary before success is sure.

➤ PENICILLIN may be the long-sought "magic bullet" which not only cures syphilis but prevents the disease. It works in rabbits and probably will work in man.

Discovery that penicillin may become a prophylactic against syphilis was made by Drs. Harry Eagle, Harold J. Magnuson and Ralph Fleischman of the U. S. Public Health Service, the Johns Hopkins School of Hygiene and the University of North Carolina.

One or two tiny doses of the yellow mold chemical, injected within a few days after exposure to syphilis, would prevent the disease from developing if humans respond as the rabbits in Dr. Eagle's laboratory at Johns Hopkins have.

Germs Checked

The germs of syphilis, called spirochetes, are stopped by the penicillin after they have invaded the body but before even the first sore of the disease has developed.

Whether penicillin will prevent syphilis from developing in people who become infected with its germs will not be known for at least two years. Doctors could have the answer in three or four months if it were not for the prudish, hush-hush attitude many people still have about this disease which attacks a quarter of a million Americans every year.

To get the answer quickly, it would be necessary to shoot living syphilis germs into human bodies, as they were injected into the rabbits. Then half the human rabbits would be given penicillin. The other half would not. If none of the first group got syphilis, and most of the second group did, it would prove that the penicillin prophylactic treatment had been successful. Those who got syphilis could later be cured by regular eight-day penicillin treatment now used for syphilis.

Stopped by prudery from making this quick, critical test, Dr. Eagle is already planning for the two- to three-year test. This will be made by trying to reach contacts of syphilis patients who come to the clinic. The contacts wanted are the men and women, boys and girls who were exposed to the disease by the patients, not the ones from whom the patients got the disease. These contacts who probably have caught the germs but have not yet developed the disease will be given the prophylactic doses of penicillin. But it will take a long time to find and treat enough of them so that the results will be conclusive.

Many Needed

It will be necessary for large numbers because, for one thing, not every contact would necessarily get syphilis. There is no way of knowing which ones would get the disease until the first sore appears. The most sensitive tests for syphilis now available do not give positive results until a week or 10 days after the primary sore appears. The time between the invasion of the germs and the development of the disease, called the incubation period, is 21 days. This period has been set from histories of cases in which the doctors were able to learn the date of exposure and germ invasion and the date of the first symptoms.

Studying the effects of various doses of penicillin given to rabbits during this incubation period led to the discovery of the prophylactic action of the mold chemical. The rabbits were given a definite number of syphilis spirochetes. Then different-sized doses of penicillin were given at different times after the germs. From these studies Dr. Eagle and associates found that the amount of penicillin needed to cure syphilis is related to the number of organisms invading the body and the time after the invasion the penicillin is given. The greater the number of organisms, the more penicillin is needed. Details of these studies are reported in the *Journal of Experimental Medicine* and were discussed at the conference on venereal diseases held at U. S. Public Health Service headquarters in Washington.

A military application of the discovery, if human trials prove successful, is one scientists are already speculating on. Soldiers likely to be exposed to syphilis could be given prophylactic doses of penicillin as they returned from leaves, as they were given sulfathiazole to check gonorrhea on returns from leaves during the war.

Science News Letter, April 26, 1947

Library. Research Institute, Delhi.

PENGUINS ON ICE—Formally dressed and curiously staring, these birds are making tracks on Pack Ice in Antarctica.

AERONAUTICAL ENGINEERING

Ram-Jet For More Speed

A new engine so light that one man can lift it is predicted to make planes beat the sun as they cross the horizon. Ram-jet is of simple construction.

See Front Cover

➤ A RAM-JET airplane that will beat the sun by traveling double the speed of sound, taking only 15 minutes to go from New York to Pittsburgh, was predicted by Dr. F. W. Schumacher, associate director of Esso Laboratories.

The pilot would be able to see the sun set in New York, rise over the horizon and then set again in Pittsburgh.

Flying in the stratosphere, the ram-jet motor will require only a tenth of the fuel needed just above sea-level. This aircraft propulsion unit was proved practical by the Navy's Bumblebee supersonic anti-aircraft weapon designed to counter Japanese suicide planes.

Much simpler in construction than conventional reciprocating engines, the ram-jet in its 1,400 miles per hour form develops one horsepower for each half ounce in weight compared with about a pound for ordinary engines. A ram-jet developing 2,000 horsepower will be so light that one man can lift it.

Flame shoots from ram-jet shown on the cover of this SCIENCE NEWS LETTER. About six inches in diameter, one jet releases heat equivalent to that of 300 domestic oil burners.

New fuels are being research-made for ram-jet use, and military developments underway promise superspeedy mail, express and passenger transport for the future.

Refrigerated as well as pressurized cabins will be needed. Without cooling, passengers would be heated to 300 degrees Fahrenheit at 1,400 miles per hour speeds, while the thermometer would rise to 650 degrees at 2,000 miles per hour.

Before ram-jet power plants are used, there will be commercial use of a combination of propeller and jet propulsion powered by gas turbine engines.

Three to ten years or longer will be needed to apply turbine power to commercial flying, depending upon the amount of research expended, in the opinion of Dr. Philetus H. Holt, Esso's assistant research director. Gas turbine and jet are combined now on the famous P-80 fighter planes.

Long flights of 3,000 miles will take six to seven hours instead of 12 to 14 hours as at present, Dr. Holt predicted.

Fuels of the future are being developed at the Standard Oil Company laboratories in Bayway, N. J., shown recently for the first time since the war. With airplane flying at great stratosphere heights, fuels must have a low freezing point to keep flowing at the intense cold there.

Science News Letter, April 26, 1947

MEDICINE

Preventing Smallpox

➤ ONE case of smallpox in New York is costing approximately $1,000,000.

Chief items on this huge medical bill are the vaccinations for about half a million persons and the health detection work necessary in tracking down persons who might have caught the disease from the first case and be spreading the germs further.

Mayor William O'Dwyer of New York City estimates the cost of an emergency program of free vaccinations at $100,000. But the mayor has urged that all the millions of residents of the city be vaccinated. Health authorities believe thousands will be vaccinated by their own physicians and the total cost of the campaign will be nearer $1,000,000.

This money is being spent to protect New York residents and millions of other people throughout the nation. But in one sense, it is a waste of money, because smallpox is a preventable disease.

The million-dollar case was brought into the city from outside the country. Many persons were exposed to the germs before it was known that the first patient had smallpox. Some of them caught the disease and others may have caught it from them.

Three victims have died of smallpox, and New York's all-out war on the disease which can be prevented will be an expensive fight.

Smallpox can be prevented by correctly done vaccination. Yet there are many persons in the United States who have never been vaccinated, and many more unvaccinated in other countries, even though doctors and health authorities the world over know that vaccination protects against smallpox. The protection does not always last a lifetime, so authorities advise revaccination after five years, particularly for those likely to be exposed to the disease.

Science News Letter, April 26, 1947

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CHEMISTRY

Bomb Products Are Known

Chemists have determined what the products of the fission of an atomic bomb are. Element 61 is yet to be named. Other research is reported.

Highlights of the annual American Chemical Society meeting, held last week in Atlantic City, N. J., are presented in this issue.

➤ JUST WHAT happens when an atomic bomb fissions and what chemical elements are formed in the big smash-up or uranium 235 atoms are now known.

The American Chemical Society meeting in Atlantic City, N. J., was told by Dr. Aristid V. Grosse, now of the Houdry Process Corp., that 34 different elements have been detected among the fission products of the kind of uranium that can be made into a bomb.

Four elements, neodymium, barium, zirconium and molybdenum, account for nearly half of the weight of the uranium split asunder with great release of atomic energy. More than 10% of the weight reappears after the fission in each of these elements.

Two elements that do not occur naturally, because they are radioactive and thus destroy themselves, are produced in substantial amounts in uranium fission. These are element 43, recently named technetium, and element 61, as yet unnamed.

For each hundred pounds of uranium 235 fissioned, 2.6 pounds of technetium and 4 pounds of element 61 are produced.

This means that at Bikini, where two bombs were exploded, several pounds of each of these hitherto non-existent elements were manufactured and let loose in the world.

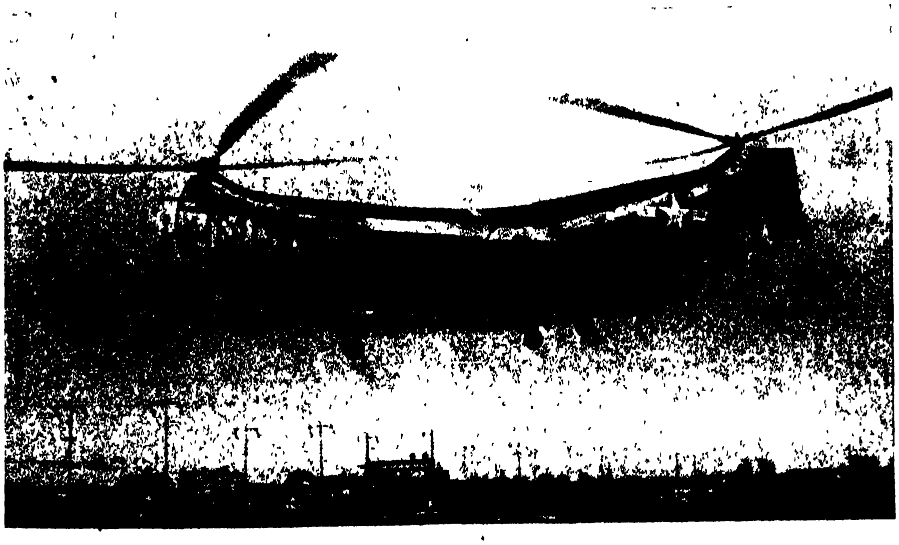
The chemists determined the amounts of elements formed by measuring the results of controlled fission or production of atomic energy in the large structure, called an atomic pile, in which slowly moving neutrons (electrically neutral atomic particles) cause the splitting of the uranium atoms in a controlled manner. The results should, however, apply in essential features to fast neutron fission such as occurs in the atomic bomb, whether it is made of uranium or plutonium.

Science News Letter, April 26, 1947

Element 61 Naming Delayed

Christening of element 61 was expected to take place at this meeting but has been delayed probably until the fall meeting of the American Chemical Society. The discoverers of the element, who worked together on the Manhattan atomic bomb project, are not yet ready to decide on the name since some of the information they wished to announce at the same time is still being kept secret.

Science News Letter, April 26, 1947



NAVY TRANSPORT—This helicopter, recently unveiled by the Navy, was designed during the war for rescue work. It can travel 100 miles an hour and carry a crew of two plus eight passengers.

Radioactive Chlorine

Chlorine, one of the elements in common salt, can be made so radioactive by exposure to neutrons in the atomic pile that one radioactive form of it will keep on giving off radiation for more than a million years. Dr. Ralph T. Overman, of the Monsanto-operated Clinton Laboratories at Oak Ridge, Tenn., reported on four activities produced by very long neutron irradiations of various chlorine compounds in the Clinton Laboratories chain-reacting pile.

Since Bikini bombs bombarded the salty sea water with neutrons, this means that some of the radioactive chlorine produced has a half-life of a million years and the effects of the Bikini bombings will be felt in this way for longer than a million years.

Science News Letter, April 26, 1947

Steel Wastes Combined

Once in a while marriage of a pair of wastrels results in the reform of both of them. Something of this sort may be realized in the chemical world by the combination of two troublesome waste-products of the steel industry, coke oven ammonia and spent pickle liquor, proposed by Dr. Richard D. Hoak of the Mellon Institute of Industrial Research, Pittsburgh.

Pickle liquor is a sulfuric acid solution used to remove oxide scale from new steel. At the end, it still contains some uncombined acid, together with a quantity of mixed iron compounds. Dr. Hoak's suggestion is to run the ammonia into the spent pickle liquor, producing ammonium sulfate, which is valuable in both agriculture and industry. The iron residues he would put back into the blast furnace, for re-extraction.

Science News Letter, April 26, 1947

Oleomargarine Good Food

The perennial dispute over oleomargarine came in for another round of discussion in a paper by Dr. Paul Gyorgy of the University of Pennsylvania school of medicine. He pointed out that in feeding experiments laboratory rats throve just as well on skim milk with added soybean oil as they did when the supplementary fat was butter.

"In the light of these and similar observations," he declared, "generalized discrimination against vegetable fats, including margarine and 'filled' milks, does not appear to be justified."

Science News Letter, April 26, 1947

CHEMISTRY

Usefulness of Adsorption

➤ ADSORPTION, the less-known physsical twin of absorption, may become a more familiar word in everyday English because it is finding an increasingly important role in chemical industry. At the meeting of the American Chemical Society in Atlantic City recently, Drs. Alfred E. Hirschler and Senta Amon of the Sun Oil Company told how adsorption is used in purifying high-grade petroleum products.

As everyone knows, a liquid is absorbed into a porous object, like a sponge or a blotter, by being drawn into its fine cracks and fissures. A liquid or a gas is adsorbed, not into a solid, but simply onto it. Its molecules cling to those of the solid surface with an almost unbreakable attraction; it is the "stickin'-est way of sticking". The adsorptive force can be broken by various means; one of the simplest is by heating.

In purifying high-grade hydrocarbons, the mixture containing them is contacted with a finely divided substance that presents a maximum amount of surface per cubic inch, like carbon or silica gel. Certain kinds of molecules are adsorbed; others are not, and can be drawn off Then the adsorbed molecules can be freed, without so many strangers in their company.

Science News Letter, April 26, 1947

Calcium Carbonate in Paint

Girls singing the old opera favorite, "I dreamt that I dwelt in marble halls," may now mean nothing more than that the rooms of their family dwelling-places have been properly painted. For the chemical substance that in polished slabs is marble, calcium carbonate, is useful in microscopically divided form as a paint extender, Dr. H. W. Siesholtz of the Witco Chemical Company, told the meeting.

Instead of grinding up marble or limestone to get for this purpose, calcium carbonate is made by chemical precipitation. This makes the particles exceedingly small—a hundred-thousandth of an inch or less. The smaller the particles the better they will spread in paint, and the better they will reflect light from the finished surface.

Science News Letter, April 26, 1947

CHEMISTRY

More Sulfur Grows Bacteria To "De-Smell" River Water

➤ SO MANY rubber manufacturing plants were dumping their wastes into the Ohio river during the war that it created a serious problem for cities down-stream that had to take their drinking water out of it. Plainly stated, it stank, and indignant citizens demanded that something be done about it. What Dr. Herbert Fleischmann, of the Covington, Ky., filtration plant did was dump powdered sulfur into the storage basins. This encouraged the growth of bacteria that feed on sulfur, and while they ate up his gifts of free sulfur they also devoured the smelly, sulfur-containing wastes that were making the trouble.

Science News Letter, April 26, 1947

CHEMISTRY

Too Little Soap Means Work in Washing Clothes

➤ TOO LITTLE soap used in the laundry means more work in getting the clothes clean, Osborne C. Bacon and J. Edward Smith, of the E. I. du Pont de Nemours & Co., told the meeting of the American Chemical Society in Atlantic City, N. J.

Using a miniature washing machine that measures the soap and the amount of power used, the scientists found that up to a certain point higher concentration of the soap lessened the time and force needed to wash the clothes satisfactorily.

Cutting the concentration of soap in half doubles the amount of work needed to get the same result. For a 20-minute washing period, if only half the proper amount of detergent is used, twice as much work is required to remove the same amount of soil.

"Soap does not remove dirt in a washing machine," Mr. Bacon stated. "It is the work, not the soap, which actually removes the dirt. The soap has done all its cleaning work before the machine starts, for the soap loosens the dirt and the mechanical action of the washer takes the dirt off, then the soap prevents the dirt from going back onto the cloth. This action of soap makes the clothes white. Where there is insufficient soap in suspension for this preventive action, the clothes usually turn out gray.

"Mechanical action and soap are independent. They do their work alone, not together, although both are needed for clean clothes." Beyond a certain concentration, the addition of more soap does not remove any more dirt, or speed up the cleansing operation."

Science News Letter, April 26, 1947

FOOD CHEMISTRY

Mild Cooking Improves Chicks' Soy Bean Food

➤ YOUNG CHICKENS and turkeys may come to market sooner as the result of being fed soy beans, agricultural and food chemists learned at the opening session of the American Chemical Society meeting in Atlantic City, N. J.

Mild cooking improves soy beans as food for young chickens, Dr. Robert John Evans of the division of chemistry and Dr. James McGinnis of the division of poultry husbandry, both of the Washington Agricultural Experiment Station, Pullman, Wash., reported. However, longer cooking under greater pressure makes the soy preparation less valuable as a source of protein for the growing chicks.

The chemists added known proteins to the feed of the chicks getting the overcooked meal, until they learned which ones gave as good growth diets as the soy meal that had had less cooking. They also digested the feeds in test-tubes. From these tests they learned that long pressure cooking destroys 30% of the lysine in the soy preparation, and 40% of the cystine, but leaves the methionine unharmed. All three are necessary for good growth of the poultry.

Further data to show that short cooking and low pressure is the best method for preparing soy bean diets comes from Drs. J. C. Fritz, E. H. Kramke and C. A. Reed of the Borden Co., whose tests with young turkeys show that more methionine makes them grow faster.

Science News Letter, April 26, 1947

CHEMISTRY

Man and Rat Are Proved To Be Vitamin Factories

➤ A MAN and a rat can do something that microorganisms cannot, except in one case. A microscopic creature named *Acetobacter suboxydans* is the sole member of his kind to be able to turn pantothenyl alcohol into the B complex vitamin pantothenic acid.

But man and his experimental opposite number, the laboratory rat, can do it with ease, according to Dr. Saul H. Rubin, director of the nutrition laboratories of Hoffman-LaRoche, Nutley, N. J. He reported his joint researches with Dr. J. M. Cooperman, Miss M. E. Moore, L. Drekter and J. Scheiner, before the American Chemical Society's division of agricultural and food chemistry.

Dr. Rubin stated that pantothenyl alcohol, which is more stable and satisfactory than the acid to use in pharmaceutical preparations, is changed in the body of a mammal to the acid form which the body needs, with full vitamin activity. This allows the pharmaceutical manufacturer to put the vitamin-forming alcohol into his preparation, where it will stay unchanged until the patient swallows it and makes his own pantothenic acid out of it on the spot in the place where it is needed.

Science News Letter, April 26, 1947

BACTERIOLOGY

Virus Murders Germ By Stealing Phosphorus

➤ THE CHEMISTRY of death in a bacterium attacked by a much smaller virus particle was described to the American Chemical Society meeting in Atlantic City, N. J., by Dr. Seymour S. Cohen of the University of Pennsylvania school of medicine. Essentially, it is a theft of phosphorus.

The virus particle, which is tadpole-shaped, has in its make-up a phosphorus-containing compound, nucleic acid. The bacterium has two kinds of nucleic acid, different from the one in the virus, as well as other phosphorus-containing substances. In a virus-infected microbe, the processes by which it normally made use of phosphorus it obtained from its environment were all shunted to the production of the kind of nucleic acid the virus wanted. The bacterium could not grow, and eventually died.

This might all be very comforting to observe in a germ; but Dr. Cohen reminded his hearers that essentially the same process happens to our own cells when they are invaded by the viruses of such diseases as smallpox, yellow fever and poliomyelitis.

Science News Letter, April 26, 1947

CHEMISTRY

Germ-Killer in Garlic Produced Synthetically

➤ A PENICILLIN-LIKE germ-killing substance known to be present in garlic can now be produced synthetically, Dr. L. D. Small of the Sterling-Winthrop Research Institute announced at the meeting in Atlantic City, N. J., of the American Chemical Society. Several entirely new compounds chemically related to it have also been made; these control disease germs that resist other antibiotic drugs.

Science News Letter, April 26, 1947

PHYSICS

Whirling in Simple Tube Separates Hot and Cold Air

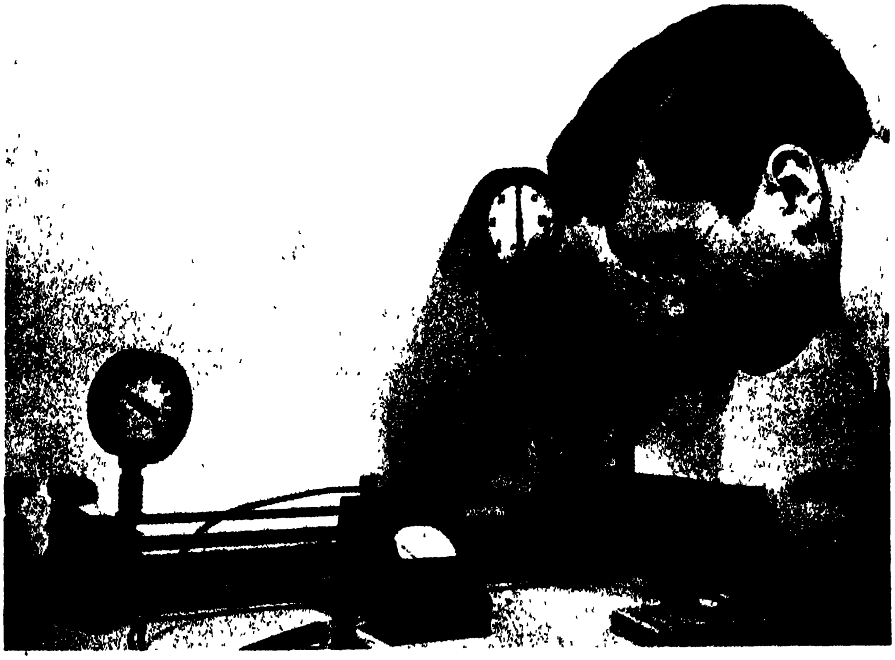
➤ HOT AIR from one end and cold air from the other come from a 15-inch-long tube into which compressed air is fed. There is no special heating or cooling equipment.

It is an improved piece of laboratory apparatus, developed by a Westinghouse scientist from a German invention. The device achieves a long-cherished dream of scientists: to separate the elements of heat and cold that are present in every gas. It may never be applicable commercially in the refrigeration or heating field, but it has definite applications in the science laboratory.

In the device, compressed air enters into a nozzle at the right end of the tube where it strikes a steel spiral that converts it into a whirlpool of rapidly spinning gases. The air in the center of the whirlpool becomes cold almost instantly, while that toward the outside becomes hot. The cold air is drawn off through a small opening at the right end of the tube, and the warm air through a similar opening at the other end. The device has no moving parts, and is inexpensive to construct.

The German inventor, R. Hilsch, claims that in his device he produced one jet of air as hot as 154 degrees Fahrenheit and another as cold as 10 degrees Fahrenheit. He predicted a possibility of obtaining air at over 400 degrees hot and also air whose temperature would be 50 degrees below zero. The instrument, made by Gaylord W. Penney, does not deliver air of widely separated temperatures, but the tube is of large diameter so that measuring instruments can be placed inside to study what is happening in the whirlpool.

Science News Letter, April 26, 1947



HOT-COLD PIPE—This tube separates hot and cold air. Compressed air is whirled by a steel spiral to make the difference in temperature.

MEDICINE

Food Allergies Cause Skin To Break Out with Eczema

➤ FOOD ALLERGY appears to be the cause of most cases of eczema of the hands.

This is indicated in a new study by Dr. Albert H. Rowe, University of California Medical School.

In 80 cases of eczema of the hands, Dr. Rowe cleared up the condition by removing the guilty foods from the patient's diet. To prove his point he had the patient eat these same foods again. A new outbreak of eczema followed.

This does not eliminate other causes of eczema, such as inhalation of pollen and dust or the irritants contacted in various occupations, but it places a new importance on the role of food allergy.

The physician's treatment, consisting of a diet eliminating the allergenic foods but protecting nutrition and weight, usually began to show results in about two weeks, the period in which the guilty foods are eliminated from the body.

The skin usually became normal. Redness, itching and scaling remained in some cases, usually because of breaks in the diet, impossibility of eliminating all allergenic foods, or secondary reactions produced by soap, water, heat, sun, wind or chemicals.

Irritations of the skin of the hands, such as contact with industrial irritants or household chores, including cooking and washing, were found by the physician in some cases to trigger the food allergy into eczema.

This is illustrated by the fact that 80% of Dr. Rowe's food-sensitive patients were women. Most housewives were able to resume their chores without ill effect after the primary cause of the condition had been removed, however.

Science News Letter, April 26, 1947

MEDICINE

Smallpox Vaccine at Peak With Year's Supply Ready

➤ RIGHT NOW is the time of year when the nation's supply of smallpox vaccine is at its peak, with practically a year's supply on hand. So you can get vaccinated, and probably should, even though health authorities do not expect any epidemic to follow the 13 cases and three deaths that occurred in New York City and environs.

The shortage which slowed New York City's vaccination program and may slow similar programs in other cities is due, apparently, to a run in the tubed vaccine. This is the form in which it is dispensed for use. Each almost needle-thin glass capillary tube contains one dose of vaccine. Ordinarily manufacturers might have half a million tubes ready to dispense, with the rest of their vaccine supply on hand in the "pulped" form.

Vaccine manufacturers ordinarily bring production to a halt at this season because the virus from which it is made does better in the cool weather.

It takes a month or six weeks to produce a batch of vaccine, starting from scratch with the calves.

Science News Letter, April 26, 1947

CHEMISTRY

Porous, Granular Compounds Can Carry Soil Fumigants

➤ EXPLODED MICA, coarse sawdust and other granular, porous substances are used as carriers for soil fumigants like the chlorides of ethylene, propylene, etc., which have been found effective for the control of borers and other soil-dwelling pests. This invention, protected by patent 2,419,073, is the work of O. H. Hammer of South Haven, Mich., assignor to the Dow Chemical Company.

Science News Letter, April 26, 1947

PHYSICS

Quiet Typewriter Platen Made of Separate Disks

➤A FRESH APPROACH to the problem of reducing typewriter noise is represented in the invention on which U. S. patent 2,418,698 has been issued to Frederick U. Conard of West Hartford, Conn. Instead of attempting to minimize the blow of type against a solid platen, as in present-day "noiseless" typewriters, this invention undertakes to provide a platen that will not make so much noise when struck.

This is accomplished by building it up of a series of separate pierced disks or washers, each just one type-space wide, strung on a cylindrical rubber cushion supported by the central steel rod. As the typebars strike, each disk yields slightly; also very little of its vibration is transmitted to its neighbors, so that the platen as a whole does not resound. Rights in the patent are assigned to the Underwood Corporation.

Science News Letter, April 26, 1947

IN SCIE

ENGINEERING

Infra-Red Studies Make Home Refrigerators Better

➤ STUDIES with the infra-red spectrometer, which help to produce a drier refrigerating fluid, are expected to bring the market an electrical refrigerator that will not need servicing more than once in 10 years, it was predicted in a paper by Drs. A. F. Benning, A. A. Ebert and C. F. Irwin of E. I. du Pont de Nemours and Company at the American Chemical Society meeting in Atlantic City, N. J.

If as little as ten parts per million of water gets into the freon used in refrigerators, it is likely to cause trouble. Analytical methods necessary to detect so little water have hitherto been extremely tedious, the standard procedure requiring four hours to complete. By the infra-red spectrometric method the water content of freon can be determined accurately in five minutes.

Science News Letter, April 26, 1947

CHEMISTRY

Chemists Getting Close To Synthetic Antibiotic

➤ WHENEVER a new natural product of plant or animal origin is discovered, chemists straightway undertake to make something like it—or better it. They have been trying to do this with penicillin, and at the meeting of the American Chemical Society in Atlantic City, N. J., Dr. Merritt C. Fernald and Dr. Walter B. Geiger of the New Jersey Agricultural Experiment Station announced that they are approaching the goal.

They have prepared a number of synthetic compounds that have much the same effects on bacteria and fungi as the natural antibiotics. The most powerful thus far investigated is known as acrylophenone. It has two drawbacks, however: it is only slightly soluble in water and is closely related to another compound that is highly poisonous to animals. So they are going on with their search for synthetic germ-killers that are safer to use.

Science News Letter, April 26, 1947

E FIELDS

NUTRITION

Jet-Tenderizer Cures and Softens Tough Beefsteaks

➤ BEEFSTEAKS and other meats that are a trifle tough won't have to be brutally mauled with pounders or mechanically chewed up by one of the newer electrically-driven devices if a new jet-tenderizing process invented by V. L. Tichy of Cleveland comes into general use. Also, it will be possible to use meat immediately after slaughtering, without the time-consuming processes of "hanging" or curing now necessary.

Mr. Tichy's process takes advantage of the long-known fact that a needle-fine jet or spray of liquid at very high pressure will penetrate flesh to a considerable depth. Workers around diesel engines are thus injured, sometimes, when a small leak develops in the high-pressure oil injector.

Exactly the same principle is used in the jet-tenderizing process. Spray-openings as small as a ten-thousandth of an inch in diameter, with pressures as high as seven thousand pounds per square inch behind them, are used to drive droplets of tenderizing fluids into the meat. The fluids may be liquid fats, fiber-softening enzyme, mild acids or anything else that will accomplish the purpose. Small solid particles may also be shot through the jets, in liquid suspension. Meat can thus be salted and peppered in advance, if desired.

U. S. patent 2,418,914 has been granted on this invention.

Science News Letter, April 26, 1947

METEOROLOGY

Facsimile Weather Maps To Be Used by AAF Pilots

➤ FACSIMILE transmitters for relaying weather maps to Army Air Force pilots by wire or radio are being installed nation-wide, it has been revealed. The system will furnish even the smallest equipped airports with up-to-the-minute weather information.

The transmission of pictures, maps and printed pages by wire or radio is not new, but recent developments have made it more practical than ever before. Facsimile transmission is now coming into wide use. Newspaper offices are planning to use special broadcasting stations to deliver important news direct to homes at regular intervals, one letter-sized page at a time.

In facsimile transmission, the picture or page to be sent is put on a cylinder and rapidly scanned by a revolving sharp beam of light that passes over it in parallel lines. The beam is then passed to an electric eye, its intensity varied by lights and shades on the picture. The electric current from the eye therefore varies. The receiver in the office or home works in reverse. A beam from a light source in it varies in intensity with the current received. This beam of light travels in rapid lines over a photographically sensitized paper, leaving an exact copy of the picture being sent.

The Army plans call for dividing the entire United States into four large networks, each covering approximately 1,000 square miles. Weather analysts in a centrally located weather bureau will prepare the maps, insert them into the transmitters, and relay copies to stations all over the nation. Pilots taking off from any field in the country equipped with facsimile receivers will have the advantage of the latest weather information.

Science News Letter, April 26, 1947

MEDICINE

Penicillin Helps to Cure Germ Infections of Bones

➤ PENICILLIN is helping the lame to walk again, at least if their trouble has been due to chronic germ infections of the bones.

A patient who for a long time had chronic tuberculosis of the knee joint and osteomyelitis of the thigh bone and the inner bone of the leg below the knee had excellent function of the leg at the end of a year, thanks to penicillin and surgical operations.

This and 57 other cases in which penicillin was used with surgery to clear up bone infections are reported by Drs. H. J. McCorkle, Henry Silvani and W. E. Stern and Miss Helen Warner, researcher, of the University of California Medical School.

The penicillin is given several days before operation. Then the surgeons remove all infected bone tissues and penicillin is again given, this time until the soft tissues and bone are healed. Details of the treatment appear in *Surgery, Gynecology and Obstetrics* (March).

Science News Letter, April 26, 1947

ENGINEERING

Electric Power from Nile To Help Egypt's Industry

➤ UPPER EGYPT is promised plenty of electric power from the Assouan dam on the Nile. Funds for the electrification of the giant dam have now been authorized, it is revealed. Development of some 270,000 horsepower is expected.

One important use planned for the electricity is the fixation of nitrogen, to supply Egypt with badly needed fertilizer. The power will also be used to develop the iron and other mining industries, as well as for lighting cities, pumping irrigation water and operating railways.

Assouan dam, completed in 1933, is located at the first cataract of the Nile, 750 miles south of the Mediterranean. Its electrification is a war-delayed project. An official study of its possibilities was begun in 1939. It provides an 85-foot head of water, and is said to store over 5,000,000,000 tons of water. Its reservoir backs up the water 180 miles, to near the second cataract of the Nile.

Construction of the earliest Assouan dam was completed in 1902. This original has been heightened twice to make the present structure. Its construction was strongly opposed by archaeologists, because the reservoir when filled covers all but the highest portions of the Temple of Philae. The temple, strengthened before the building of the dam was started, is now partially disclosed at low water.

Science News Letter, April 26, 1947

OPHTHALMOLOGY

Blindness in Babies Reduced by Over 75%

➤ BLINDNESS in new-born babies, resulting from a germ disease, has been reduced by more than 75% since 1908, when the National Society for the Prevention of Blindness started its fight against this form of blindness.

Public education and legislation are credited with this achievement in the annual report by the society's president, Mason H. Bigelow.

The increase in life expectancy has increased the amount of eye disease and the machine age has brought further hazards to eyesight through industrial accidents. Efforts to combat these dangers to vision are now being made by the Society.

Science News Letter, April 26, 1947

ASTRONOMY

Jupiter Is Closest in May

Except the moon, Jupiter is the brightest object in the May sky. May will bring a solar eclipse, most important astronomical event of the year.

By JAMES STOKLEY

➤ AS IF to call attention to the reappearance in the evening skies of a characteristic constellation of summer, one of the brightest planets is now visible nearby. Look to the southwest on May evenings and the most conspicuous object (except the moon) that can be seen is Jupiter. Standing in the constellation of Libra, the scales, its place is shown on the accompanying maps, depicting the skies at 10:00 p.m., your own kind of standard time (or 11:00 p.m. daylight saving time) on the first of the month; an hour earlier about May 15, and two hours earlier on the 31st. Just below Jupiter, Scorpius, the scorpion, is beginning to appear, with Antares, red in color, just getting above the horizon. Later in the evening than the times given it rises higher and the rest of the scorpion is in view.

Jupiter Opposite Sun

On the 14th of May Jupiter is in opposition—that is, it is directly opposite the sun, which means that it rises at sunset and is in the sky all night. Also, it means that the planet is closest to the earth (only 407,300,000 miles) which is responsible for its being so bright. Incidentally, on May 5 the moon, a day after it is full, passes very close to Jupiter, just to the south. They are closest at 7:09 p.m. EST, which will be before it gets dark over most of the country.

Another planet can also be seen. This is Saturn, which stands in the west in the constellation of Cancer, the crab. In astronomical magnitude it is 0.5, considerably fainter than the minus 2.1 of Jupiter, but still equal to a typical star of the first magnitude.

Speaking of stars, the brightest now seen is Vega, in Lyra, the lyre, over to the northeast. Just below this figure is Cygnus, the swan, with Deneb, also of the first magnitude, though in the position shown it looks fainter because it is so near the horizon. In the southwest, to the left of Cancer, is Leo, the lion, with the star Regulus. And next to Leo, continuing to the left, is Virgo, the virgin, with Spica. Above the eastern part of Virgo is Bootes, the bear driver, in which Arcturus shines.

Canis Minor in West

Low in the west, below Cancer, is Canis Minor, the lesser dog, with Procyon. To the right of the dog we see Gemini, the twins, with Castor and Pollux, the latter of magnitude one. Low in the northwest in Auriga, the charioteer, is Capella, a star that shone directly overhead on winter evenings, and now is about to leave our view for a while.

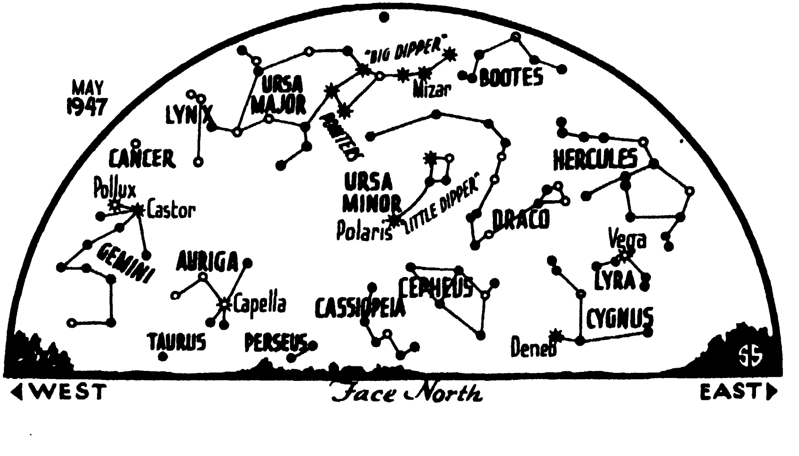
As for the other planets, Mercury is not to be seen at all in May, but Venus, of magnitude minus 3.3, more brilliant even than Jupiter, comes up in the east just before sunrise. Mars is in the same part of the sky, though far fainter, with magnitude 1.5 At the beginning of May, Venus rises first. However, the two planets pass on May 17, and after that Mars is the first to appear. On the morning of May 18, the moon, a narrow crescent two days before it is new, passes Mars and Venus, so the three bodies in the sky will make an interesting spectacle.

The most important astronomical event of the month—indeed of the year—takes place on May 20 when the shadow of the moon sweeps across the earth for the first time since July, 1945, causing a total eclipse of the sun. That one occurred during wartime. It was quite short, and early in the morning in the parts of the United States and Canada where it was visible. Though the May 20 eclipse is not visible at all in North America or Europe, it provides a much better opportunity for astronomers to make the observations that are possible only when the moon hides the sun, and so many parties are traveling to the places in South America and Africa where it can be seen. Not all of these are astronomers, for such an eclipse gives physicists an unusual opportunity to study problems of the transmission of radio waves. As the moon cuts off ultraviolet radiation from the sun the ionosphere—the radio "roof" high in the atmosphere that keeps all except the shortest of radio waves from leaving the earth and shooting into outer space—is quickly affected. Thus radio transmissions from and across the path of the shadow will be made and measured.

Moon's Shadow

At 7:09 a.m., EST, on May 20 the moon's shadow will touch earth at a spot in the Pacific Ocean several hundred miles off the coast of southern Chile. Thence it moves northeastward, tracing out of the path of totality, about 100 miles wide, in which the sun will be completely hidden. As it sweeps across Chile, it goes to the south of Valparaiso, but includes Santiago, where the total phase occurs just after sunrise. It then moves across central Argentina, Paraguay and Brazil, reaching the Atlantic coast at Bahia at 7:45 a.m., EST (though by local standard time it will be 9:45 a.m.).

Going to sea, the shadow quickly crosses the Atlantic, reaching the coast of Liberia, in Africa, about 9:25 a.m., EST, which will be 12:25 p.m. there. It goes along the Gold and Ivory Coasts,



and heads inland, due east, and then a little southeast. The shadow leaves the earth from a spot in Tanganyika at 10:25 a.m., EST, but there it will be at sunset. Over a much larger area than this narrow path, including all of Africa, much of the South Atlantic and most of South America, there will be a partial eclipse, with the dark disk of the moon hiding more of the sun the nearer one is to the path of totality.

Long Eclipse

One of the most attractive features of this eclipse, to astronomers, is its relatively long duration. While the sun can be totally eclipsed for as long as 7½ minutes, it is rarely that one lasts more than a couple of minutes. In the middle of the Atlantic Ocean this eclipse will last for 5 minutes 14 seconds, but as it is hard to make entirely satisfactory observations from a ship this will not be of so much value. In Liberia, however, the duration will be but a few seconds less than five minutes. Along the coast of Brazil it will last about four minutes which is still quite good.

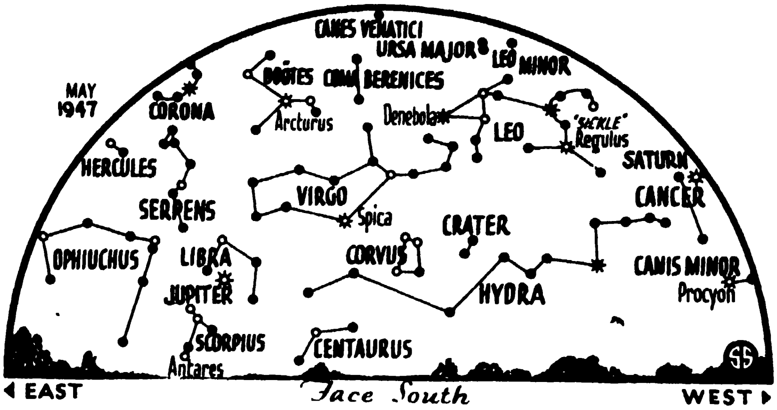
Many expeditions of astronomers have gone from observatories in the United States, Canada and various European countries to favored locations in Brazil and Africa. Photographs will be made with cameras large and small. Some will be made through spectroscopes, to analyze the light of the eclipse. Thus we will gain added knowledge of the sun, particularly of its mysterious corona, the outermost layer. Until a few years ago it was visible only at eclipse time, but there are new techniques by which the brightest parts may be observed at other times. Still, however, to see it in its entirety an eclipse is needed and that is one of the main reasons that makes astronomers travel thousands of miles, gambling with possible cloudy weather, to be there when the moon hides the sun.

Celestial Time Table for May

May	EST	
4	11:58 p.m.	Full moon
5	7:09 p.m.	Moon passes close to Jupiter
10	2:00 a.m.	Moon farthest, distance 251,600 miles
13	3:08 a.m.	Moon in last quarter
14	3:00 a.m.	Jupiter opposite sun and nearest, distance 407,300,000 miles
17	7:00 a.m.	Venus passes Mars
18	3:46 a.m.	Moon passes Mars
	4:30 a.m.	Moon passes Venus
20	8:44 a.m.	New moon, total eclipse of sun visible in South America and Africa
22	2:00 a.m.	Moon nearest, distance 224,600 miles
24	5:38 p.m.	Moon passes Saturn
26	11:35 p.m.	Moon in first quarter

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, April 26, 1947



✲ ✱ ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

MINING

Demonstration of Mine Explosions Are Made

➤ THE DEMONSTRATION of coal-mine explosions and preventive measures, being given in Bruceton, Pa., by the U. S. Bureau of Mines on Saturday, April 26, is part of an educational program of the government office discontinued during the war but revived a year ago.

The recent Centralia disaster, and the following explosion with several fatalities at Exeter in Pennsylvania, are evidences of the need of such a program. In an industry where explosive gases and organic dusts collect in the air in underground chambers, and in which explosives are necessarily used to loosen seams of coal, every worker concerned, from boss to helper boy, needs instruction in the danger and how they are best lessened.

While this demonstration is open to the public, the program is primarily for mine supervisory officials, foremen and operators. It is being given at the Bureau's experimental mine, with manmade explosions of methane gas and of coal dust. Methods of extinguishing fires, and the testing of safe and unsafe explosives for blasting purposes, will be demonstrated.

For the coal-dust explosion, 700 pounds of the finely pulverized material will be spread in the mine entrance and ignited by a stick of dynamite. Dynamite is not an explosive that may be used in coal mining under the government's safety code, but it is still used in some mines.

The Bureau has tested many explosives used in mining and has designated some that will not cause dust explosions when used. These are designated as "permissible explosives." The demonstration will show how permissible explosives will not ignite a cloud of dust, as well as the danger of using a nonpermissible.

The Bureau's experimental mine is reported to be the only one of its kind in the world. It was opened in 1911, and the principal work undertaken in connection with it has been the development of ways to prevent gas and dust explosions. Rock-dusting, coating the walls and ceilings of coal mines with pulverized limestone, or other noncombustible material, is one of its great achievements.

Science News Letter, April 26, 1947

CHEMISTRY

Rubberlike Compound Can Be Used as Insulation

➤ A SYNTHETIC rubberlike insulating compound invented by a German, Willi Mertens of Berlin, is the subject of patent 2,418,978, vested in the Attorney General. It is a mixture of polyisobutylene, styrene and paradivinylbenzol, heated until it has become soft and rubbery.

Science News Letter, April 26, 1947

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WYOMING

Yes, even THIS summer you may fish in its mountain streams, ride horseback through its hills and canyons, find Indian relics and marine fossils in a region of great historical and geologic interest.

The Patons welcome a limited number of guests at their ranch in the Big Horn country. They offer plenty of ranch grown food, comfortable cabins and gentle horses. May they tell you more? Write:

Paton Ranch, Shell, Wyoming

Do You Know?

Most plant *seeds* germinate faster, and in some cases better, in soil that is not fertilized.

Boysenberry is one of California's principal bushberry crops; it is a variety of the blackberry.

Yellowstone had been a U. S. National Park 75 years on March 1, 1947; it is the grandfather of all national parks, the first to be established.

Mental disorders affect, in some degree, some 8,000,000 Americans, it is estimated; mental cases fill more than half the hospital beds in the nation.

Bark from mangrove trees is used for tannin, and the timber, hard, heavy, tough and durable, for tropical construction.

Oysters contain copper, iron and manganese, needed by the human body; also calcium and phosphorus that assist bone growth, and iodine that aids the thyroid gland.

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CHEMISTRY

Mold Will Make Alcohol

Molds will take the place of malt, saving grain needed for food and other uses. The mold turns starches into sugars in this method.

➤ ALCOHOL for both beverage and industrial purposes will be produced in this country on a major scale without the ages-old malting process, thus saving the grain formerly used in making malt for food and other uses. This revolution in one of the world's oldest industries is being wrought by turning malt's traditional job over to one of the molds sometimes found on old bread.

At the meeting of the American Chemical Society at Atlantic City, N. J., S. L. Adams and associates, chemists for the distilling firm of Seagram and Company, told of improved methods they have worked out for the mass culturing of this valuable mold, and of their company's plans for its use in large-scale alcohol production.

At the Northern Regional Research Laboratory of the Department of Agriculture, in Peoria, Ill., government researchers have developed their own mold-production method. They feed it on a watery waste product of the liquor business known by the unappetizing name of "thin distillery slop," with a little ground corn and ground limestone added. After letting the mold grow on this for a couple of days at a temperature of about 140 degrees Fahrenheit, they pour a few gallons of it into 100 gallons of grain mash. The starch in the mash is soon converted into fermentable sugars, ready for the yeasts to work on.

During the war, another chemist, Leo M. Christensen, then at the University of Nebraska, took out a patent on still another method for producing this valuable mold, in which common bran is the principal nutrient used.

However produced, the mold is able to take over malt's old job because it uses the same chemical tool on starch, to turn it into fermentable sugars. This is a starch-digesting enzyme called amylase. When grain is sprouted, in the making of malt, quantities of amylase are produced to turn the reserve food-stock of starch into sugar, for the benefit of the young plant. Then the sprouting grain is heated just enough to kill it, then dried and ground up. The amylase, still present, will work on any starch to which it is added, changing it into sugar.

It just happens that this mold produces amylase just as good as that in malt—maybe even a little bit better. The chemists in the Peoria laboratory got a slightly higher yield of alcohol, per bushel of grain, when they used mold than they did when they used malt.

Although mold conversion of starch into sugar for fermentation is the newest thing in modern industrial chemistry, it still has an ancient history. The same mold has been used in the Orient for centuries in making alcoholic beverages out of rice—for example, Japan's famous saké. But in those old lands it has always been employed on a handcraft basis; only now is the Occident giving it a big-time job.

Botanically the mold is known as *Aspergillus niger.* It is a first cousin of *Penicillium notatum,* the mold that produces penicillin, the drug that has revolutionized medicine.

Science News Letter, April 26, 1947

CHEMISTRY

Chemical Makes Safer Wave-Fixer for Hair

➤ AMMONIUM thioglycolate, a wave-fixer for hair, is a much safer compound to use than the ammonium hydrogen sulfide that was formerly the standard, Dr. Cornelia T. Snell of New York told the American Chemical Society meeting in Atlantic City, N. J. The older compound was irritating even on unbroken skin, and if it got into a scratch it raised blisters. Ammonium thioglycolate, tested on rabbits, produced relatively little irritation in scratches, and on a whole skin caused no more redness than a good shampoo liquid.

Science News Letter, April 26, 1947

War-famed *Stalingrad,* Russia, is found to be in a natural gas-bearing region; drilling during 1946 found the gas-bearing stratum about a half mile below the surface.

MEDICINE

Treatment for Cirrhosis

Liver extract gives cirrhosis patients new lease on life. Tissues are restored and weight is gained. Return of appetite is first sign of improvement.

➤ A NEW TREATMENT for cirrhosis of the liver which seems to give the patients a new lease on life by restoring their appetites is reported by Drs. Daniel H. Labby, Robert E. Shank, Henry G. Kunkel and the late Charles L. Hoagland of the Rockefeller Institute for Medical Research in the *Journal of the American Medical Association* (April 19).

The treatment consists of injections into the veins, two or three times a week, of a crude liver extract. The survival rate at the end of two years in the patients given this treatment was 77% compared with 45% among patients treated by diet and vitamin supplements and 22% to 25% among untreated patients.

All the patients were in what physicians term the "decompensated" stage of cirrhosis. They had either jaundice, hemorrhage, dropsy or fluid on the abdomen or a combination of these conditions. Of the 30 patients 21 were chronic alcoholic addicts.

One of the first signs of improvement in these seriously ill patients was a return of appetite, which in many cases had been practically nonexistent. At the same time they began to feel well and lost the tired feeling that many had complained of. They began to gain weight, wasted tissues being restored. The fluid on the abdomen disappeared in 12 of the 30 and another seven did not have to be tapped to withdraw the fluid nearly as often as before the start of treatment.

"In many instances such physical, economic and social rehabilitation was accomplished that it was difficult to compare the state of apparent health during the course of treatment with the previous serious clinical state," the physicians report.

Five patients who had been treated from 10 to 18 months have been able to get along without treatment for from four to 15 months without relapsing.

The patients were required to abstain from alcohol but were not on a special diet. They were advised to eat foods high in protein, such as meat, cheese and eggs, and rich in starch and sugar. Vitamins were not given, except for short terms of vitamin B treatment for those with symptoms of a lack of this vitamin.

The increased appetite with consequent increase in food eaten and in weight gained and in vigor is believed the chief factor responsible for the patients' improvement.

The liver extract may also encourage rebuilding of the liver tissue and help restore to normal the various chemical processes that have gone wrong in the patient with cirrhosis. Further study is needed to show whether this is the case.

Science News Letter, April 26, 1947

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CHEMISTRY

Light Energy Makes Rubber From Petroleum Compounds

➤ GREEN PLANTS still monopolize the secret of using sunlight to change carbon dioxide and water into food stuffs, but man seems on the threshold of performing a parallel chemical miracle by utilizing light to turn petroleum compounds into synthetic rubber. At the meeting of the American Chemical Society in Atlantic City, N. J., Prof. Keith J. Laidler of the Catholic University of America told of first steps in this direction, taken with the aid of metallic vapors that carry the energy of light to make the transformation.

The task which the light-energy is given to perform is the removal of hydrogen from the hydrocarbon molecules. If single hydrogen atoms are knocked out, free hydrocarbon groups remain that may combine into chemically useful long chains, or polymers. It the atomic twins that constitute hydrogen molecules are loosened, chemically active and industrially useful compounds known as olefins are formed.

The metals which Prof. Laidler has found most effective in his photochemical syntheses when used in vaporized form are zinc, cadmium and mercury. Nature of the reactions is strongly influenced by the color of the light used.

Science News Letter, April 26, 1947

ANTHROPOLOGY

Life Ended Below Forty In Turkey of Ancient Times

➤ LIFE DIDN'T begin at forty in ancient Turkey; as a rule, it ended then, or even earlier.

Dr. M. S. Senyurek of the University of Ankara, examining a collection of the skeletons of 120 Turks who lived between 1000 and 5200 years ago, found that three-fourths of these individuals had died before they reached their fortieth birthdays. Only seven got to be as old as 60.

Of those who lived beyond their thirteenth birthdays, the average age at death was 35 for men, 28 for women. The lower death-age for women is attributed to the hazards of childbirth.

Death rate was high among children: 25 of the group did not live to be 12 years old. Dr. Senyurek feels sure, too, that if skeletons of very young children had been preserved they would have indicated an even higher child death rate.

Details of the study are presented in the *American Journal of Physical Anthropology* (March).

Science News Letter, April 26, 1947

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Whence May Flowers?

➤ PERENNIALLY, as sure as it rains in the spring, we hear the chirping reassurance: "April showers bring forth May flowers!" This is true in a way, but in a larger way it isn't.

It is true that the warm rains of April trigger the explosion of bloom that comes in May. They provide moisture to fill the rapidly expanding leaves and stems and flower-buds, and the warmth speeds up the growth. But it could be possible for flowers to bloom in May if not a drop of rain fell in April—though that latter contingency is hardly imaginable in most places. If there were deep snows and a slow thaw in March, and a bit of rain as May came in, the flower show would still go on.

For the flowers are all there long before April showers evoke them. Packed away as fairly well-developed, though small, beginnings in bulbs, corms, rootstocks, tubers are the leaves and stems and flowers that will unfold as the rising warmth stimulates them and as they greedily suck moisture through the roots into their expanding cells. You can prove this for yourself, if you like, by sacrificing a hyacinth or tulip bulb, splitting it fairly down the middle and searching for the tightly-packed flower primordia within the innermost scale.

In most spring-blossoming plants, the flowers and new leaves that gladden our eyes in May are actually formed and put in winter storage some time during the preceding year. This is certainly true of flowers on woody plants, such as lilacs, magnolias and tulip-trees, in which next year's buds begin to form even as this spring's buds begin to unfold. It is true also of the perennial herbs that depend on underground storage organs, which are stocked with food, principally starches and sugars, during the post-flowering time in late spring and summer.

But is not merely the forming and stocking of what are to be next spring's flowers that predetermine the beauty we are to see in May. Winter helps, too. A very large proportion of our best spring flowers will not unfold unless they get a thorough chilling after the buds are formed. This is true of such familiar and favorite flowers as dogtooth violet, trillium, spring-beauty, lily-of-the-valley, lilac, weigelia and many others. April showers may bring forth May flowers, but December freezes must come first.

Science News Letter, April 26, 1947

MINERALOGY

Tektites Are Moon Chips

➤ STONES from the moon are in a number of American museums and private mineralogical collections, if the hypothesis advanced by H. H. Nininger, director of the American Meteorite Museum in Winslow, Ariz., is valid. He holds that the puzzling stones called tektites, found in several parts of the earth, are really chips off the surface of our satellite, blasted loose by the impact of large meteorites coming in at super-V 2 rocket speeds.

Tektites are glass-like stones, usually of rounded shape as if formed from blobs of molten stuff spinning through space. Many of them bear on their surfaces signs of a secondary melting, which Mr. Nininger thinks may have occurred when they struck the earth's atmosphere and suffered somewhat from the friction that erodes away most meteorites as "shooting stars" before they reach the ground. Coming the relatively short distance from the moon, he explains, they would not have full meteorite velocities, hence would undergo much less frictional losses.

Getting them off the moon offers no great difficulty to Mr. Nininger's hypothesis. The moon, like the earth, is the target of constant bombardment by meteorites. Only, having no atmosphere to shield it, the moon takes the full impact of all that come its way. Really big ones hit so hard that they are gasified, with terrific explosions. A major explosion of this kind would spin a shower of fragments of the moon's own rocky material far up into space, and at the same time the heat would melt it to something like liquid glass. These blobs would soon cool into rounded, glassy pebbles—tektites.

Most of the explosion-shower debris would of course fall back on the moon, but some pieces would be thrown out at high enough velocities to escape the moon's weak gravitational field—only one-sixth that of the earth. Part of these would drift into space and become a part of "chaos and old night", but others would get caught by the earth's gravitational field and fall as quasi meteorite showers.

There are other theories of the origin of Tektites—volcanic birth, explosion-showers from meteorites striking the earth, etc.,—but Mr. Nininger has answers for them, and believes that his hypothesis has a greater chance of being correct.

Science News Letter, April 26, 1947

CHEMISTRY

Chlorinated Hydrocarbons Kill Bacteria in Water

➤ OBJECTIONABLE bacteria and algae in water supplies can be killed with chlorinated lower hydrocarbons, for example trichlorobutane, trichlorohexane, etc., instead of straight chlorine, which is itself often objectionable, states Charles W. Harnden of Berkeley, Calif. Patent 2,419,021, which he has obtained on this discovery, is assigned to the Shell Development Company.

Science News Letter, April 26, 1947

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BLUE WATER NAVIGATION—Svend T. Simonsen—*Cornell Maritime,* 198 p., illus., $3.50. Originally prepared to teach those engaged in amphibious operations during the war, this text can also be used for home study; no other books are required as necessary pages from Nautical Almanac are included.

BUILDING SKIN BEAUTY—Mary MacFadyen —*Emerson,* 30 p, illus, paper, 25 cents An easy-to-follow guide to skin care.

CHILD CARE AND TRAINING—Marion L Faegre and John E Anderson—*Univ. of Minn.,* 7th ed. rev., 310 p, illus., $3.25. Continuing to serve as parents' guide, discussion group handbook, and college text, this useful book is up-to-date.

CHIPS FROM THE BLASTED MOON—H. H Nininger—*Desert Press,* 34 p, illus., paper, 25 cents. Hypotheses on the lunar origin of tektites are outlined Tektites are glass-like stones of rounded shape bearing no relation to the geological strata in which they are found.

CITIES OF AMERICA—George Session Perry—*McGraw-Hill,* 287 p., illus, $3 50 The history of our country is well defined in the character and traditions of her cities, 22 are analyzed here, representing every section of the U.S.

CLIMATE AND THE ENERGY OF NATIONS—S F Markham—*Oxford Univ. Press,* 2nd ed. rev, 240 p, $4 50 An interesting analysis of the effects of temperature on history and postulations as to the future use of air conditioning to stimulate activity

COAL CHEMICAL INDUSTRY: Trends and Problems—P J. Wilson, Jr. and J H Wells—*Mellon Inst.,* 5 p, illus, paper, free. The technical and engineering problems and the progress made by this industry are presented

ECONOMIC RESEARCH AND THE DEVELOPMENT OF ECONOMIC SCIENCE AND PUBLIC POLICY, *Nat. Bur. of Economic Research,* 198 p, $1 Twelve papers presented at the twenty-fifth anniversary meeting discuss problems toward which research should be directed.

ELECTRONICS What Everyone Should Know —Calvin and Charlotte Mooers—*Bobbs-Merrill,* 231 p., illus, $2.75 How electrons are put to work for home and industry and what they may be expected to do in the future is capably explained in this non-technical book for "everyone".

EXPLAINING THE ATOM—Selig Hecht—*Viking,* 205 p., $2 75. Written by one who did not work on the atom bomb, with information from public sources, this book's purpose is to supply a background for thought and action in connection with the legislation on questions of atomic energy

FISHES OF THE PACIFIC COAST OF CANADA —W. A. Clemens and G. V. Wilby—*Fisheries Research Board of Canada,* Bulletin No. LXVIII, 368 p., illus, paper $1.68, cloth $2.18. About the marine fishes of this region; a point-of-departure for further detailed study of distribution and life histories.

MODERN WOMAN: THE LOST SEX—Ferdinand Lundberg and Marynia F. Farnham—*Harper,* 497 p., $3.50. A readable description of the causes and cures of unhappiness and neurosis, especially in women, together with a discussion of the social implications. It is based on experience with women patients in a psychiatrist's consulting room.

MOLD AND MILDEW CONTROL—S. S. Block —*Florida Engineering and Industrial Experiment Station,* 50 p, illus., paper, free An attempt to correlate information now available from Army investigations has resulted in this booklet useful to all who live in warm moist climates.

ON UNDERSTANDING SCIENCE, AN HISTORICAL APPROACH—James B Conant—*Yale Univ. Press,* 145 p, $2. Some of the great minds of the past, their concepts of science, analyses and solutions of problems are introduced to the reader by the president of Harvard University under the auspices of the Terry Foundation

PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY—Luther P. Eisenhart, ed —*Publ. by the Society,* Vol. 91, No. 2, 91 p, paper, $1 Eight papers include a discussion of atomic physics and international cooperation, an electronic reading aid for the blind, race relations, medicine in the USSR and photographic meteor studies.

PROCEEDINGS OF THE INDIANA ACADEMY OF SCIENCE, Vol. 55, *State Library,* 217 p, $3. Papers include anthropology, bacteriology, botany, chemistry, geology and geography, history, mathematics, physics, psychology, and zoology, many are abstracts only.

THE RARE-EARTH ELEMENTS AND THEIR COMPOUNDS—D. M. Yost, H. Russell, Jr, and C S. Garner—*Wiley,* 92 p., $2 50 A timely discussion of these elements, now increasingly important with present concepts of atomic structure.

THE STORY OF THE UKRAINE—Clarence A Manning—*Philosophical Lib.,* 326 p., $3 75 The history of a thousand years of struggles of a people to maintain their language and traditions

THE STRUGGLE FOR ATOMIC CONTROL—William T R. Fox—*Public Affairs Committee,* 32 p, paper, 20 cents. A discussion of today's important and absorbing world problem.

THE SUN'S SHORT REGULAR VARIATION AND ITS LARGE EFFECT ON TERRESTRIAL TEMPERATURES—C G Abbot—*Smithsonian Institution,* Misc. Col. Vol. 107 No 4, Pub. No. 3893, 33 p., paper, 30 cents. This regular average periodicity, which appears to be a new discovery, is not to be confused with temporary weather periods

THE TALKING WIRE; The Story of Alexander Graham Bell—O. J. Stevenson—*Messner,* 207 p., illus., $2.50. A revealing biography for teenagers of the man who made the first telephone.

TROPICAL AND SUBTROPICAL FRUITS—B. E. Dahlgren—*Chicago Natural History Museum,* 72 p, illus, paper, 50 cents In this interesting booklet, the fruits are discussed in groupings of those of Old World and those of New World origin.

WORLD WEATHER RECORDS, 1931-1940—H. Helm and Frances L. Clayton—*Smithsonian Institution,* Misc. Col. Vol. 105, Pub. No. 3803, 646 p., paper, $3.50. This comprehensive volume was prepared in cooperation with the various official weather services and observatories of the world.

YOU ARE BORN TO VICTORY—John Glossinger—*Duell,* 115 p., $2. Mottoes for living by the author.

YOUR CALIFORNIA GARDEN AND MINE—Sydney B. Mitchell—*Barrows,* 261 p., illus, $3. Practical views of the writer on ornamental planting are especially valuable to those gardening in California.

Science News Letter, April 26, 1947

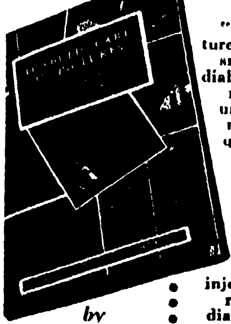
CHEMISTRY

Metallic Sodium Makes Lead Sheathing Last Longer

➤ LEAD SHEATHING on electric cables and similar exposed installations can be made to last much longer by alloying it with metallic sodium, reported Drs. B. B. Reinitz and N. A. Zamborsky of the Okonite Callender Cable Company to the American Chemical Society meeting in Atlantic City, N. J. They told of cables so protected that have been in use for 10 years with no sign of age hardening, corrosion or other abnormal condition.

Science News Letter, April 26, 1947

to smooth the way for
DIABETICS



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• New Machines and Gadgets •

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TOY motor boat, of aluminum, is powered by a tiny outboard motor operated by two flashlight batteries. The electric motor is of "fleapower" size, and was developed during the war for use in the radio-electronics field.

Science News Letter, April 26, 1947

WATER VAPOR indicator, developed especially for inspecting the breathing oxygen supply for aviators, can be applied to gases in general. The relatively simple instrument, which requires no special skill to operate, uses only a small sample of the gas.

Science News Letter, April 26, 1947

WEIGHING MACHINE, for factory use in quick-weighing for packaging dry products from peanuts to tacks, works on the buoyancy principle. Weighing trays are mounted on vertical cylindrical floats in a liquid. When the added weight sinks a float the proper amount, its tray is automatically tripped.

Science News Letter, April 26, 1947

SILICONE product, which eliminates the need of lard or other greases in bread baking pans, is sprayed and baked onto the pans; one application is good for 200 bakings. The coating prevents the bread from sticking to the pans and gives more evenly browned loaves. As yet, it is available only for commercial bakeries.

Science News Letter, April 26, 1947

HEATPROOF paint, that will prevent hot metals from corroding and scaling at temperatures as high as 1850 degrees Fahrenheit, is claimed to protect metals under all weather conditions. Its uses range from furnace pipes to mufflers on trucks aand tractors.

Science News Letter, April 26, 1947

PLASTIC TABLEWARE, complete with plates, cups, saucers, bowls and platters, is designed for heavy duty because the dishes are practically unbreakable under ordinary use. Made in various colors, the plastic articles resemble usual tableware, are tasteless, resistant to fruit juices, aand not injured by boiling water.

Science News Letter, April 26, 1947

PLASTIC funnel for filling bottles is in reality two separate funnels, one much larger than the other, that can be used separately or in combination. When combined, the top of the smaller funnel, which has a half-inch spout, fits tightly over the two-inch spout of the larger funnel, making an ideal funnel for pouring large volumes of liquid into small-mouthed bottles.

Science News Letter, April 26, 1947

You are invited to accept one of the few memberships still vacant in

Things of science

Membership is strictly limited to 10,000 and will be for at least the next nine months. This is America's most unique "club."

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Question Box

AERONAUTICAL ENGINEERING

About how fast will a ram-jet plane be able to travel? p. 260.

ASTRONOMY

When is the biggest astronomical event of the year to take place? p. 266.

BACTERIOLOGY

How does a virus kill a germ? p. 263.

BOTANY

Do April showers bring May flowers? p. 270.

CHEMISTRY

What are the products of the atomic bomb? p. 261.

What is a substitute for malt in making alcohol? p. 268.

What is man using light energy to make? p. 269.

Why is ammonium nitrate a mysterious explosive? p. 258.

MEDICINE

How can smallpox be prevented? p. 260.

How can syphilis be prevented medicinally? p. 259.

What causes eczema of the hands? p. 264.

PHYSICS

How can beefsteaks be tenderised without pounding? p. 265.

Where published sources are used they are cited.

Pictures: *Standard Oil Co. (N. J.), front cover; U. S. Navy, p. 259; Piasecki Helicopter Corp., p. 261; Westinghouse Corp., p. 263.*

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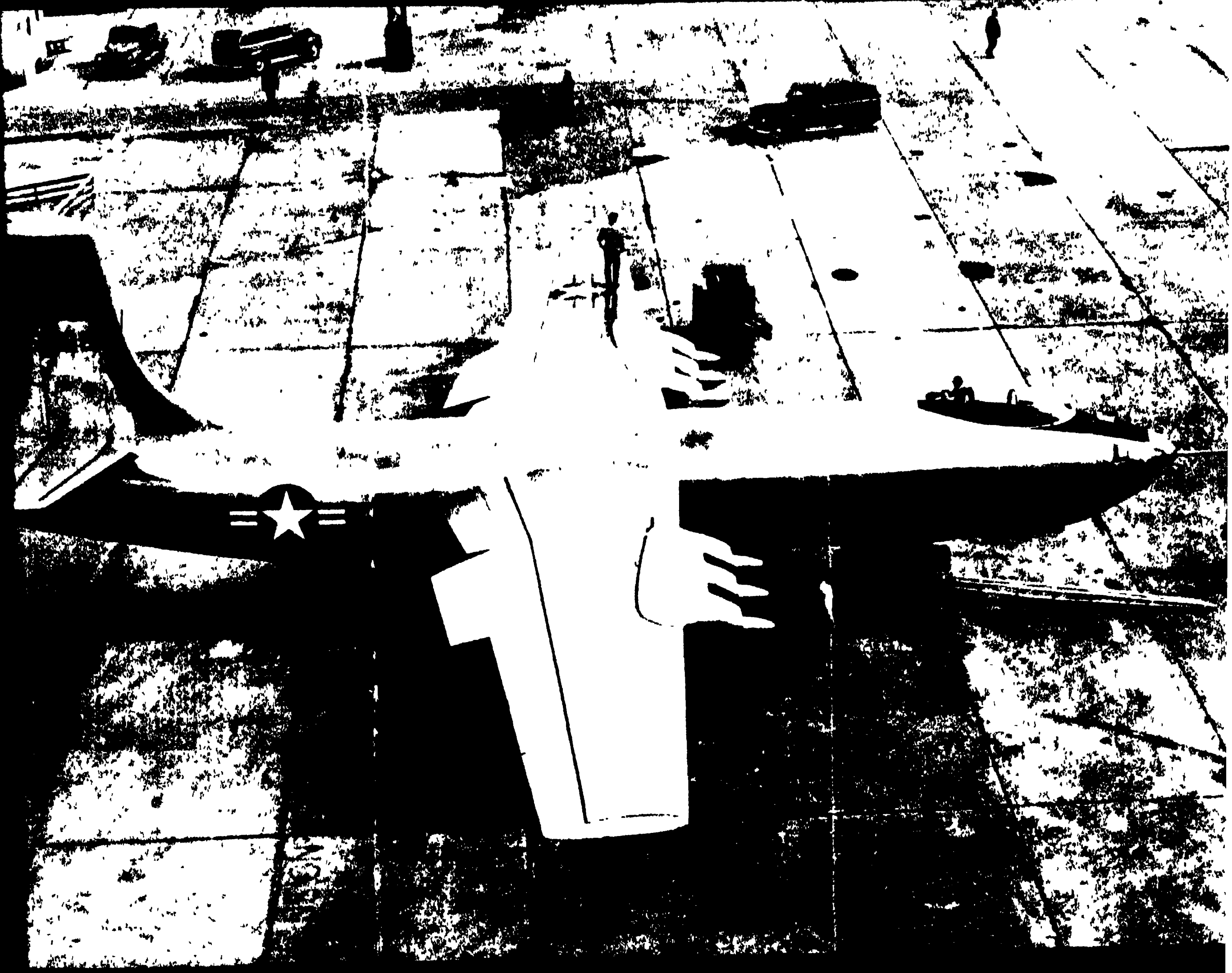
SCIENCE NEWS LETTER



A SCIENCE SERVICE PUBLICATION

DENTISTRY

Chemical's Role in Caries

Amino acid may prevent tooth decay. It changes saliva of persons with caries to a saliva like that of persons without tooth decay.

➤ TESTS of a chemical that may become a new tooth decay preventive are now under way on a small group of human guinea pigs at Forsyth Dental Infirmary in Boston.

The chemical is called tryptophane. It is one of the amino acids that are building blocks of proteins in meat, cheese, blood and muscle. Its possible role as a tooth decay preventative was discovered by Mrs. Naomi C. Turner. Latest findings are reported by her and Dr. George E. Crowell in the *Journal of Dental Research* (April).

Children just over an attack of measles, mumps, infantile paralysis or other virus-caused disease may in future be given some doses of tryptophane to protect their teeth from the decay that frequently starts after these diseases. This is suggested by one part of Mrs. Turner's studies.

Whether tryptophane will prevent tooth decay is not known yet. Mrs. Turner has already found, however, that it changes the saliva of persons with tooth decay to a saliva chemically more like that in persons who have no tooth decay.

Lowers Blood Sugar

Tryptophane also lowers the amount of sugar in the blood. This discovery was unexpected and is being further studied by an expert on diabetes. Until its exact significance is understood, Mrs. Turner feels that use of tryptophane for attempted control of tooth decay should proceed with caution. In her own experiments, the chemical is given as a white, crystalline powder in water midway between breakfast and lunch. It will take some time before results from these studies show whether or not tryptophane controls tooth decay.

First clue to the possible role of tryptophane in preventing tooth decay was discovered surprisingly, because Mrs. Turner was making a three-year study of the common cold among school children. She was finding out things about colds that could not be explained, so she decided to go back to school herself and learn more biochemistry. In a laboratory study of the effect on starch of saliva, where cold germs might lurk, she found that her own saliva was different from that of the girl working next to her. She made the test on others in the class and found the difference was related to whether or not they had much tooth decay.

This difference, called "dextrinizing time," is in the rate at which the saliva converts starch into sugars. It is fast for saliva from persons with tooth decay, slow for persons without.

Other Chemical Difference

Another chemical difference in salivas from mouths with and without tooth decay is the rate at which the saliva takes the color out of preformed starch blue. From those with rampant tooth decay it takes an average of 13 minutes to turn the starch blue white. Saliva from those without caries does it in less than five minutes.

These and other studies lead Mrs. Turner to believe that tooth decay and freedom from it are associated with varying amounts of two enzyme chemicals in the saliva. The chemicals are called alpha and beta amylase and they play a role in changing starch into sugar. An enzyme more familiar to the layman is pepsin in the stomach which plays a part in digestion of protein foods.

A little Negro boy who had had mumps gave the clue to the possible use of tryptophane to protect children's teeth after certain childhood diseases. When this little boy first came to the dental clinic, he had a "dextrinizing time" of 120 minutes, and good teeth.

Some months later when re-tested, his dextrinizing time had dropped to 35 minutes. At this time, Mrs. Turner was using a new test for the dextrinizing time, and she thought perhaps it was a poor test and that was the reason for the conflicting results on the little boy's saliva. But when Dr. Crowell, her dentist associate, examined the boy's teeth the second time he found several new cavities. Questioning the boy's mother, they found he had had mumps in the time between the two tests.

Remembering that the mumps virus lives in the saliva-producing glands, Mrs. Turner began wondering whether the virus had something to do with the change in the boy's saliva and, subsequently, in the development of cavities in his teeth.

Science News Letter, May 3, 1947

MEDICINE

Growth Studies to Bring Clues to Cause of Cancer

➤ CLUES to the cause and possible control of cancer will come from fundamental research into the secrets of life and growth.

This is the opinion of Dr. E. Newton Harvey of Princeton University. Dr. Harvey spoke at a meeting of the American Cancer Society in New York.

One result of scientific probing into growth secrets, Dr. Harvey said, was discovery that cutting a nerve in the tissue of an insect results in a tumor. This has no relation to human cancer, but it may give some clues to fundamental causes of cancer.

There will be no chemical cure for cancer developed in the immediate future, Dr. Perrin Long of the Johns Hopkins University School of Medicine predicted. Dr. Long is the scientist who introduced the sulfa drugs into this country.

The way to the development of a chemical treatment of cancer will be very difficult. Dr. Long said that the nitrogen mustard gases and certain sleeping medicines, called urethanes, were being investigated, but nothing like the sulfa drugs and penicillin had been found for cancer.

The scientists all agreed that vast sums of money are needed, both for research and to extend treatment of cancer patients. Five million dollars could be used almost immediately, but no more than $20,000,000 could be spent for research purposes within a single year during the near future.

The limit is due to lack of personnel and facilities. Personnel and facilities are needed for research, treatment and training of new workers. The estimate was made by Dr. Lewis Weed, chairman of the National Research Council's Committee on Growth, which allocates the American Cancer Society's research funds.

Science News Letter, May 3, 1947

25 JUN 1947

PHYSICS

Cosmic Rays From Sun

Minute particles, more powerful than atom radiations, may come from solar flares around sunspots. Stars other than our sun may send rays to earth too.

➤ AN ANSWER to one of the great mysteries of the universe has been suggested.

The mystery: Where do cosmic rays come from?

The solution: Some cosmic rays at some times come from the sun. They may come from the solar flares which occur in the neighborhood of sunspots. If they do, then flares on stars other than our sun may account for all the rest of the cosmic rays which bombard the earth from outer space.

Cosmic rays, more powerful than atomic radiations, pierce your body more than 20 times each second. The reason you survive this attack is that so few of these rays reach the earth.

Dr. Frank H. J. Figge of the University of Maryland Medical School recently reported experiments linking cosmic rays with cancer. He believes cosmic rays may act on certain chemicals in the human body to start cancers.

"Circumstantial" Evidence

Evidence that some cosmic rays come from the sun was presented to the meeting of the National Academy of Sciences. Scott E. Forbush of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington cautioned that the evidence of cosmic rays coming from the sun is "circumstantial."

Clues to the solution of the mysterious origin of cosmic rays came from the sunspots that interfere with your enjoyment of shortwave radio broadcasts.

When sun flares appear, the scientist explained, shortwave radio broadcasts may be wiped out. This is because the flares near the sunspots send out ultraviolet light. The light strikes the ionosphere over our heads. Shortwave radio broadcasts are normally reflected from the ionosphere. When the ionosphere is attacked by the ultraviolet light from sun flares, the broadcasts do not get through.

Scientists at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington keep records of these disturbances. They also have instruments which record the intensity of cosmic rays bombarding the earth. These two sets of records may give scientists the first real clue as to the origin of cosmic rays.

Cosmic Rays Increase

Mr. Forbush said three unusual and sudden increases in cosmic rays have been recorded in the last 10 years. All three of these periods of increased cosmic ray activity were at the same time as radio fadeouts and sun flares. This made Mr. Forbush suspect that the sunspot flares are responsible for some of the cosmic rays which bombard us.

The flares during the three periods of cosmic ray increase were extremely intense and unusually long. No cosmic ray increases were noticed during other flares during the period.

Cosmic ray observations were made at widely separated points. At Cheltenham, Md.; Godhavn, Greenland, and Christchurch, New Zealand, the unusual increases were noted at the time of the three flares. Near the magnetic equator, at Huancayo, Peru, no increased cosmic ray activity was observed.

The flares and cosmic ray increases were recorded for Feb. 28, and March 7, 1942, and July 25, 1946.

Sun flares act like giant-size betatrons, one of the atom-smashers of modern science, according to the new theory of cosmic rays. Mr. Forbush explained that it is known that there are very strong magnetic fields in the region of sunspots. These magnetic fields are continually changing in intensity. This sets up an electrical field.

The electrical field generates particles powerful enough to reach the earth. These are the cosmic rays which created the three periods of intense cosmic ray activity. This same process on stars throughout the universe sends a continuous bombardment of cosmic rays through space to the earth.

Oddly enough, it has been calculated that the total effect of the cosmic rays reaching the earth's surface is about equal to the light from the stars.

The theory presented contradicts many other explanations of cosmic rays, though some scientists have suggested a magnetic acceleration such as Mr. Forbush proposed.

Science News Letter, May 3, 1947

BOMBER SUBWAY—To get from one compartment to another in flight on the mammoth XB-36, crew members must ride a miniature subway. The tunnel is two feet in diameter and 85 feet long. A scooter, propelled by an overhead cable, is the subway "car".

Linlithgow Library.

PUBLIC HEALTH

Epidemics Threaten Nation

Facts support opinion that lack of money and shortage of personnel may cause our health defenses to crumble.

➤ INCREASING danger of epidemics threatens the nation. Public health experts are alarmed. They fear that our health defenses are crumbling.

Low salaries for the professional public health workers are the cause. These men and women are the troops who hold the front line of the war against disease. But like the school teachers, they are being forced out of health departments into other work in order to meet the increased costs of living. Few new recruits can be found to fill the ranks.

The storm signals are up, warns Dr. C.-E. A. Winslow, the editor of the *American Journal of Public Health.* He lists some of them as follows:

One-third of the people of the nation are without the services of a local health department organized on a full-time basis.

Fewer than half the counties of the United States have organized full time public health protection.

An average of only 61 cents per capita was spent for local health service in 1942 in the face of an estimated need of at least $1 per capita.

The physicians and engineers who are currently receiving graduate training in public health are fewer than the number needed to fill existing vacancies.

The salaries paid to public health nurses are in many, if not most, health departments below the decent subsistence level for a self-respecting professional.

The universal opinion of state health officers is that lack of personnel is the chief obstacle to extending public health protection in their statees.

"The death of a child living on a back street, or on the edge of a swamp or in a mountain cabin, the convulsions of an expectant mother, an epidemic of one sort or another, are the kinds of things that inevitably happen when public health service is inadequate," Dr. Winslow declares.

The only solution, he says, is to increase salaries of public health workers, whether doctors, sanitary engineers, nurses and all. Most states and cities need to increase salaries by at least 20%, on the average to get and keep able workers. In many communities the rate of increase should be much greater.

Science News Letter, May 3, 1947

AERONAUTICS

Faster Planes to Appear

See Front Cover

➤ THE FIGHT for faster planes in the better than 500-miles-an-hour class continues. Two forthcoming versions are now revealed. One is a six-engined gas-turbine jet bomber. The other is a rocket-powered research craft to explore behavior in speed-of-sound flights.

The bomber, built by the Glenn L. Martin Company, Baltimore, is reported ready for field taxi tests. The supersonic research craft, an improved brother of the Army XS-1, is under construction by Bell Aircraft Corporation, Buffalo, the organization that built its predecessor.

The new jet-propelled bomber, to be known as the XB-48 until finally ready for mass production, when it will become the B-48, has a span of about 108 feet, and an overall length of nearly 86 feet. Its gas-turbine engines were built by General Electric. One particularly noticeable feature is the thinness of its wings, an essential in high speeds. It is shown on the cover of this SCIENCE NEWS LETTER.

An unusual landing gear has been installed on the plane. It is the so-called "bicycle type" which has two wheels in tandem under the fuselage to take the main shock of landing, and two small wheels near each wing tip to give stability during ground operations.

The supersonic research craft will be know as the XS-2, and its primary use will be as a very speedy flying laboratory to explore the problems of transonic flights, in the 500-to-800 mile range, and of supersonic flights of higher speeds. The purpose is to obtain scientific data upon which to base the designs for future Army combat aircraft.

The XS-2 has a stainless steel body, and like the XS-1, is rocket powered. Rocket engines built by Reaction Motors, Inc., power the earlier plane, which is now undergoing field tests in California. Unlike the XS-1, which has conventional wings, the new plane will be equipped with swept-back wings, a feature that is expected to contribute to speed.

Science News Letter, May 3, 1947

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HISTORY OF SCIENCE

Benjamin Franklin Started Science Ties with Russia

➤ IF BENJAMIN FRANKLIN were living today he might be accused of subversive activities by American super-patriots. He might even be haled before a Congressional investigating committee.

Before the meeting of the American Philosophical Society, founded 204 years ago by Franklin himself, a Russian student of scientific history, Dr. Eufrosina Dvoichenko-Markoff, produced proofs that this elder statesman among the Republic's founding fathers had been in active correspondence with Russian scientists, was a member of the Russian Academy, and sponsored the candidacies of two Russians for membership in his own Society. Franklin, in fact, established the first scientific contact between Russia and this country.

Franklin's two candidates for membership in the American Philosophical Society were both of the nobility: Baron de Klingstedt, whom he met in 1777, and Princess Dashkaw, who was elected to membership in the Philosophical Society in 1789, the same year that saw Franklin's election as a foreign member of the Russian Academy.

Dr. Dvoichenko-Markoff, who presented these hitherto unknown facts in Russian-American scientific history, is a lecturer at the New School for Social Research, New York.

Science News Letter, May 3, 1947

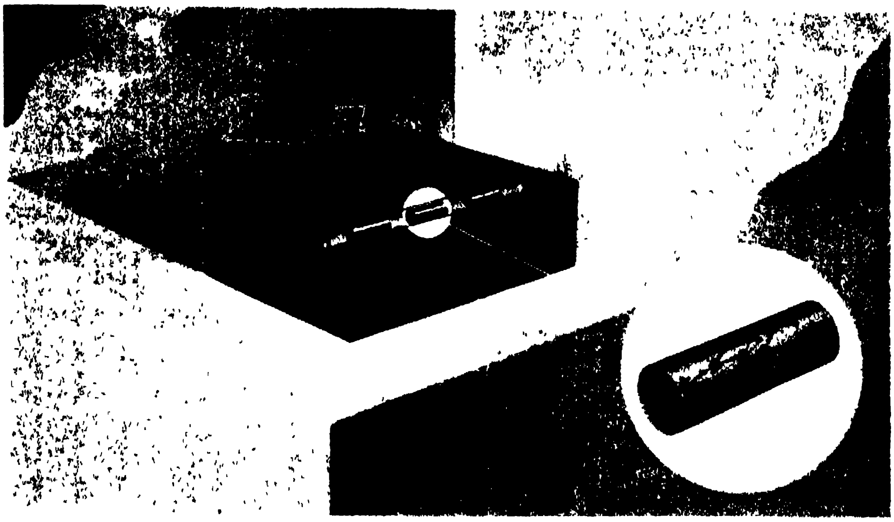
BIOCHEMISTRY

Fungi Family Feuds Kill Participants in Battle

➤ BITTER FAMILY fueds between fungi belonging to the same species, ending in the generation of poisons that kill the feudists and all their relations, have been discovered by Dr. Arnold J. Ullstrup of the U. S. Department of Agriculture, working in the laboratories of Purdue University.

He grew mutually antagonistic cultures of the fungus that causes dry-rot of corn. Subsequently he filtered and sterilized the liquid culture fluid on which they had been fed. This filtrate proved toxic to either of the warring fungus strains, to any culture of the same species, and to some fungi outside the species.

Science News Letter, May 3, 1947



ATOMIC PILE—Visualization of Brookhaven scientists shows what goes on inside a graphite pile structure. Inset is a drawing of a chain reaction to produce power, neutrons and radioactive isotopes; White dots represent fission products, dots within circles U235, and dark dots show neutrons.

NUCLEAR PHYSICS

Atomic Energy Laboratory

Government-owned Brookhaven National Laboratory will have staff of 300 scientists to study peacetime use of atomic power and will become a training center.

➤ BROOKHAVEN National Laboratory for atomic research is now under construction at Brookhaven, L. I., N. Y., on the 6,000-acre site of Camp Upton and will be ready for the 100 scientists expected later this year.

It is a govenment-owned, government-financed undertaking, operated by Associated Universities, Inc., under contract with the United States Atomic Energy Commission. Associated Universities is an organization of nine major Eastern universities. Representatives of these institutions constitute the board of trustees which is erecting the plant and will direct the laboratory's activities.

The plan is to make this project a center of atomic research and training, particularly to find peacetime applications of atomic energy. The laboratory will provide facilities for research to universities, industrial organizations and other research groups under a permanent scientific staff, and it will be equipped with apparatus which individual institutions would be financially unable to obtain.

Some of its scientific activities are already under way, particularly the design of an atomic pile and other large equipment. Plans call for the construction of a graphite uranium pile, and what will be known as a "hot" laboratory where radioactive isotopes may be separated. A second pile is planned; it will have 100 times the neutron flux of the first.

A 30- to 40-million electron volt cyclotron is to be obtained; also an electro-nuclear machine capable of accelerating either electrons or positive particles to energies of a billion volts. A 20,000,000-volt electro-static generator is another piece of equipment of the heavy type.

The laboratory expects to concentrate on fundamental research. This will include work in the physical, chemical, biological, medical and engineering aspects of atomic science. With a permanent scientific staff of 300, and a visiting staff from cooperating universities of 200, it will become a great training center for young scientists, it is expected, as well as a research institution

Science News Letter, May 3, 1947

Flavor in *peanut butter* depends in part on stopping the roasting of the nuts at precisely the right moment.

MEDICINE

Preventing Ulcer Relapses

Anti-ulcer hormone obtained from hog intestines helps patients get well without relapses. Expense of preparing medicine limits research.

➤ A MEDICINE which helps stomach ulcer patients get well and stay well even after they have stopped taking it was reported by Drs. A. C. Ivy and M. I. Grossman, University of Illinois, at the meeting in Chicago of the American College of Physicians.

The medicine is called enterogastrone. It is a hormone chemical obtained from hog intestines. In the form now used, it is a white powder with a bitter taste which forms a light tan, clear solution in water. The patients get it by injection into the muscles, so they do not know about the bitter taste.

Enterogastrone is expensive. As now produced on a laboratory scale it costs about $2 to produce the amount needed for one patient for one day, although this daily dose amounts to only a few grains. Patients get the medicine six days a week for one year.

Because of this high cost, the number of patients on whom it has been tried has been limited. So far, 58 patients have been given the medicine. Today Dr. Ivy reported on 27 patients.

Results are "excellent" in 23 of this group, he stated. Although five had a return of ulcer symptoms during the course of treatment, they are all now free of such symptoms. Of the 27, five have been without symptoms for a year or more since they have stopped getting the medicine. One man has gone 25 months without ulcer symptoms and without treatment.

One 60-year-old man, who had ulcer attacks four and five times a year for 47 years, is now on his second course of enterogastrone treatment for return of symptoms. But for the first time in 20 years he was without trouble from his ulcer for a period of nine months.

Dr. Ivy emphasized the relapse-preventing effect of enterogastrone. With the usual medical treatment, about 60 out of 100 ulcer patients relapse within two years. With enterogastrone, the relapse rate is very much lower, and it is lower than it was previously in this group of patients.

Explaining what enterogastrone is, Dr. Ivy pointed to the common experience that a fatty meal causes the stomach to empty slowly. Experimentation has shown that, in the average person, when fat composes more than 10% of the volume of a meal, stomach movements are depressed and stomach emptying is slowed. Along with this there is a checking of the hydrochloric acid production by the stomach.

The fat, however, acts in the intestine, not the stomach, to check stomach activity. This stomach-checking action is due to a hormone, enterogastrone, released from the intestinal walls when fat is in contact with them.

Use of this hormone in treatment of stomach ulcer followed studies showing that hydrochloric acid and pepsin are factors which extend an ulcer and make it chronic, though they probably do not start the ulcer.

In other studies, it was found that an ulcer which occurs in 98% of dogs following a certain kind of operation could be prevented in all but 24% when they were given enterogastrone. In addition, ulcer failed to develop in all but two of 28 dogs in the usual time after treatment was stopped.

Science News Letter, May 3, 1947

PHOTOGRAPHY

New Instrument Aids In Aerial Photography

➤ AERIAL photographs, made in surveys of large areas, may now be taken along straight and parallel lines in the sky. It is done with the aid of a new instrument used in conjunction with the war-developed navigation system known as Shoran.

The new device is an Army development, already tested in flight. Perfected models of the instrument will enable a pilot to fly a 100-mile course without deviation of more than 100 feet.

Shoran itself was developed for the precision bombing of known targets while blacked out by weather or darkness. A plane equipped with special transmitter-receiver apparatus can know its exact position by use of high-frequency radio beams sent out and received back from two land-based stations. The apparatus computes the location automatically by triangulation. The system has now been adapted to use in making aerial surveys of great tracts of land.

As the aircraft flies its course, the new indicator installed in the photo-airplane is mechanically simulating in miniature the flight path of the plane. A pointer on the indicator precisely duplicates the craft's progress and direction over the ground. Threaded rods, calibrated to scale, accurately indicate the actual distance from the aircraft to each of the two ground stations.

When the aircraft drifts from its set course, the Shoran equipment automatically pulls the pointer away from the indicator's simulated flight path. The pilot immediately makes the necessary correction in his course.

Science News Letter, May 3, 1947

WOOD TECHNOLOGY

American Woods to Rival Burma Teak for Ships

➤ WHEN THEY "hit the deck" on future Navy ships, our sailors will do it on U. S. A. wood. Burma teak wood, standard for battleship decks, has a new rival. The deck material is a built-up, specially treated product of American woods, developed by the U. S. Navy and the U. S. Forest Products Laboratory, Madison, Wis.

Several types of this so-called composite wood are under test on Navy vessels. One type, installed on the landing deck of a giant carrier, has already successfully withstood 18,000 airplane landings. It is made of layers of redwood and cottonwood, both treated with resins and compressed to considerably less than original thickness.

In other types, basswood and hard maple are used. The ideal is a hardwood face and under surfaces of lighter weight domestic wood. The idea is to make American warboats independent of imported woods such as the costly teak from Burma. This has been the standard covering for weather decks on United States battleships and cruisers for nearly half a century. Teak is prized for its strength and durability, and the government stock piled a lot of it in 1939.

Science News Letter, May 3, 1947

BIOPHYSICS

Electricity of Human Cells

When sitting or lying still you burn energy at the rate of a 100-watt lamp by passing electrons over compound "batteries", connected in series.

➤ YOUR BODY uses up energy at about the same rate as a hundred-watt lamp when you are sitting or lying still, Prof. Eric G. Ball of Harvard Medical School stated before the meeting of the American Philosophical Society in Philadelphia. Like the lamp, the body obtains this energy by a process which involves the flow of an electric current.

"In the living cell, electrons flow from the foodstuffs we ingest to oxygen, thus reducing the oxygen to form water," he continued. "The 'filament' of the cell over which these electrons flow is not of uniform composition as it is in a light bulb. The electrons in the cell are passed along over a chain of compounds composed of iron-containing proteins, the cytochromes, and vitamin-containing units named co-enzymes.

"The over-all process involves a potential change of about 1.17 volts and a total flow of current in all the body cells which amounts to about 76 amperes. The process occurs, however, in a step-wise fashion which involves five or six successive transfers of electrons between the various components comprising the cellular 'filament' or oxidative chain. Each pair of components may thus be looked upon as forming a battery, with the pairs connected in series. A drop in voltage occurs with the interaction of each pair in this series, the magnitude of which may be estimated from our knowledge of the oxidation-reduction potentials of each of the systems involved."

Science News Letter, May 3, 1947

CHEMISTRY

Heavy Oxygen Will Aid Studies in Chemistry

➤ A KIND of heavy oxygen, with an atomic weight of 18 instead of the usual 16, can now be used to settle long-disputed points in chemistry and physiology, Dean Hugh S. Taylor of Princeton University told the American Philosophical Society. The isotope separation techniques developed by the Manhattan District make this type of oxygen available for research purposes in any reasonable quantity if the cost can be met.

As an example of the long-standing problem already solved with molecules "tagged" with heavy oxygen, Dean Taylor mentioned the fates of water and carbon dioxide taken in by plants. Both compounds contain oxygen, the sum of which is in excess of the plant's needs for its food- and body-building processes. Plants have long been known to give off oxygen: where did it come from? By the use of "tagged" molecules of water and carbon dioxide it has now been demonstrated that the oxygen going in with the carbon dioxide stays in as part of the plant structure, whereas the oxygen that goes in as part of water comes out again as pure oxygen.

Science News Letter, May 3, 1947

PLANT PHYSIOLOGY

Self-Photo Traces Poison

➤ RADIOACTIVE TRACER atoms are being used to chart accurately the course of one of the new plant-killing chemicals known as INBA, from the spot where a very small quantity of it is placed on a bean leaf, down the stem and throughout the rest of the plant. The work is being done by Drs. John W. Wood, J. W. Mitchell and George W. Irving, Jr., at the U. S. Department of Agriculture's experiment station at Beltsville, Md.

INBA, which spells out in full as 2-iodo-3-nitrobenzoic acid, belongs to the same chemical family as the now familiar 2,4-D. It is being used in the present experiments partly because of the readiness with which radioactive iodine can be built into its molecules, making it a tracer compound of high power.

Spread of the poison through the plant can be traced in either of two ways: a Geiger counter can be applied to various parts of the plant body and the "ticks" counted, or the plant can be cut off, pressed flat in contact with a photographic film and left for a suitable exposure period, after which the radioactive spots and lines will be found accurately registered on the negative.

The INBA does not spread to any great extent through the leaf to which it has been applied. Instead, it travels with the food formed in that leaf down to the main stem, then up that to its apex, down it into the roots, and up into the other leaves. Both methods of recording its presence show a special tendency for the chemical to concentrate in still-unopened leaf-buds, which accounts for the effectiveness of plant-killers of this type in crippling their victims through prevention of further growth.

Science News Letter, May 3, 1947

SELF-PHOTO—This picture, taken by the radioactivity of the bean plant itself, shows the traces of the plant-killing chemical.

CHEMISTRY

Distilling Esters Off Makes Better Apple Cider

➤ BETTER FLAVORED cider is promised in the process on which patent 2,419,286 has been issued to W. A. Rooker of Winchester, Va. Before permitting the apple juice to ferment, he distills off the volatile esters and other compounds responsible for apple flavor, which are partly lost in fermentation.

Then, after fermenting the juice to the proper point he puts the flavors back in.

Science News Letter, May 3, 1947

MEDICINE

Electric Test for Heart Picks Cases Overlooked

➤ HEART DISEASE undetected by the ordinary methods used by physicians can be spotted now.

One out of four persons ill with heart disease does not show characteristic patterns on the ordinary electrocardiograph.

Dr. Frank N. Wilson and associates of the University of Michigan use exploring electrodes placed successively across the chest, from the right of the breastbone to the left border of the chest.

Records obtained from these chest positions give information about the heart of a more direct nature than do the usual electrocardiograms obtained from electrodes on more distant areas of the wrist and ankle.

Studies by Dr. Maurice Sokolow and associates in the University of California Medical School show the new method is now ready for application to patients.

Electrocordiographs record and measure electric waves transmitted to the areas of wrist and ankle by the contraction of the heart. The waves produce patterns characteristic of the different conditions affecting the heart. Dr. Sokolow said characteristic patterns can be determined in about 75% of patients with heart disease.

Some localized abnormalities of the heart are obscured by the larger mass of more normal heart muscle in the transmission of the impulse from the heart in the conventional placing of the electrodes. In these cases the ordinary electrocardiogram appears normal, although heart defects are present.

Science News Letter, May 3, 1947

CHEMISTRY

Onion Juice with 2,4-D Is Fatally Unpleasant

➤ ONION JUICE mixed with 2,4-D boosts the weed-killing capacity of the chemical from ten to twenty fold. This is shown in experiments at Michigan State College, carried out by E. H. Lucas and Dr. C. L. Hamner.

They mashed up onions and mixed the juice with distilled water in varying proportions, then dissolved 2,4-D and sodium carbonate in the mixture. This was used on test plants, alongside of other test plants receiving "straight" 2,4-D solution. The 2,4-D with onion-juice added proved many times more effective.

Proportions of 2,4-D to onion juice were quite important, the experiments showed. Greatest effect was obtained when one part of onion juice was dissolved in from twenty to thirty parts of water. Both above and below that ratio the killing power diminished.

Curiously enough, no increase in killing power of the 2,4-D took place when garlic juice was substituted for onion juice, although garlic is a close botanical relative of onion. Tomato juice even caused a falling off in killing power.

The two experimenters state that they do not know yet why onion juice should have such an enhancing effect on 2,4-D. They are continuing their experiments. The onion juice won't smell up your yard, by the way.

Science News Letter, May 3, 1947

PHYSICS

V-2 Rocket Tests Diffuser of Ram-Jet

➤ GERMAN V-2 rockets fired over the desert at White Sands, N. Mex., are helping American scientists plan new high-speed power plants for future flying.

A Nazi missile fired recently carried a section of a ram-jet, or "flying stovepipe." In a successful experiment, the V-2 served as a flying wind tunnel to test the diffuser of a ram-jet. The diffuser slows down incoming air on the flying stovepipe so that the compressed air can be used to speed the ram-jet.

Pressures measured as the diffuser on the head of the rocket soared to an altitude of 88 miles were received by scientists on the ground by means of radio equipment.

Most of the flight was wasted on the ram-jet test as the flying stovepipe requires oxygen, while the V-2, carrying its own supply, reaches altitudes higher than ram-jets will be able to fly.

Army Ordnance experts said that ram-jets are designed for flight at certain altitudes with the highest about 90,000 feet, or a little above 17 miles. Rockets have reached altitudes of more than 100 miles.

Ram-jets for flight at lower altitudes are predicted for the future with speeds twice that of sound, but booster rockets will be needed to achieve speeds great enough for the ram-jet to operate.

Science News Letter, May 3, 1947

IN SCIEN

GEOLOGY

Wrong Glaciers Used To Interpret History

➤ THE WRONG kind of glaciers were used as examples in interpreting the recent geologic history of the Midwest, Prof. William H. Hobbs of the University of Michigan pointed out to the American Philosophical Society meeting in Philadelphia. The story of Ice Age deposits has been read in terms of the relatively puny glaciers of the Swiss Alps, which were the best-known glaciers at the time when the idea of Ice Ages was first proposed.

There is one place in the world, now easily accessible, where the same kind of ice sheet still exists that spread over most of eastern North America during Pleistocene time. This is Greenland. It will be necessary to reinterpret North American glacial history in terms of what is going on in Greenland now, Prof. Hobbs declared.

Science News Letter, May 3, 1947

WILDLIFE MANAGEMENT

Dry DDT Best to Keep From Killing Fish Food

➤ DDT USED for mosquito control on waters in which fish live will do less harm to water insects and other small aquatic life forms on which fish feed if applied as a dry dust than if sprayed as an oil solution or a water emulsion. This conclusion was reached by Clarence M. Tarzwell of the U. S. Public Health Service, as a result of careful experiments on a series of shallow ponds at the Carter Memorial Laboratory near Savannah, Ga.

Emulsions putting DDT on the water at the rate of one-fifth of a pound per acre killed some fish directly, as well as many of their food insects. Dusting treatments at the rate of one-tenth of a pound per acre disturbed the balance of life in the ponds to at least a slight extent; when the rate was reduced to one-quarter of that, the effects were correspondingly diminished.

Details of the research are given in *Public Health Reports* (April 11).

Science News Letter, May 3, 1947

E FIELDS

EPIDEMIOLOGY

Wild Birds' Mites Carry "Sleeping Sickness" Germ

➤ MITES on wild birds such as yellow-headed blackbirds and English sparrows carry the dangerous virus that causes encephalitis, commonly called sleeping sickness, five scientists at the University of California have discovered. The scientists are Drs. W. C. Reeves, W. McD. Hammon, D. P. Furman, H. E. McClure and B. Brookman.

The mites are considered another link in the chain connecting wild and domestic fowl with the transmission ot horse and human encephalitis and with the survival of the virus germ between epidemics. Chicken mites and some common mosquitoes have previously been found carrying the virus.

Attempts to prove that the wild bird mites transmit the disease have not yet been made. The discovery was made with mites taken from birds' nests in Kern County, Calif. They carried the virus of western horse encephalitis. Guinea pigs, hamsters and mice got the disease when injected with this virus from the mites. Details are reported in *Science* (April 18).

Science News Letter, May 3, 1947

PHYSICS

Compound Is Sensitive To Ten-Millionth of Degree

➤ AN ELECTRIC temperature-measuring device so sensitive that it responds in a thousandth of a second to a temperature change of as little as one ten-millionth of a degree was described before the meeting of the American Philosophical Society in Philadelphia by Prof. Donald H. Andrews of the Johns Hopkins University.

The instrument, known technically as a bolometer, was developed during the war when it became necessary to measure small pulses of infra-red radiation. The sensitive part of the device was made of an unusual compound of an unfamiliar chemical element; columbium nitride. This passes small electric currents with virtually no resistance when operated at a very low temperature.

Hooked up to a loudspeaker, this superconducting bolometer gave out characteristic sounds when the infrared pulses struck it. When no current was being passed through, it still gave out sounds, but of a different kind; these were caused by the movements of the electrons within the superconducting strip. One unexpected result was the picking up of local radio broadcasts when the bolometer was at certain temperature levels.

Science News Letter, May 3, 1947

PLANT PHYSIOLOGY

Heated Corn Seedlings Produce Sterile Pollen

➤ HEAT-TREATED corn seedlings grow up into plants unable to produce fertile pollen, reports Dr. Donald F. Jones, geneticist of the Connecticut Agricultural Experiment Station, in *Science* (April 11). He suggests that this discovery may be of value in hybrid plant breeding, where precautions to prevent fertilization with the plant's own pollen are often elaborate, toilsome and costly.

In his experiments, Dr. Jones sprouted corn grains at 85 degrees Fahrenheit, and when their roots and shoots were between one-quarter and one-half inch long exposed three lots of them for one hour to temperatures of 104, 122 and 140 degrees, respectively. They were then planted in plots and left in the greenhouse until it was certain that they would grow, after which they were set out in the field alongside plants from the same kind of seed that had been planted in the open, in the ordinary way.

The heat-treated seedlings grew up into plants that averaged 90 inches in height, as against 101 inches for the unheated controls. They formed tassels, but produced no viable pollen.

Another observation by Dr. Jones indicates that Iowa is not necessarily where the tall corn grows. He states that corn from the same lot of seed planted in the Northeast and Midwest at the same latitude grows taller in the East. Higher temperatures and brighter sunlight may have something to do with this. Also, corn grown under the partial shade of tobacco cloth grows taller and has thinner leaves than corn immediately outside the shelter, though in this instance the temperatures are the same.

Science News Letter, May 3, 1947

CHEMISTRY

Chemical Coating Lessens Danger from Exhaust Pipe

➤ DANGER of fire from hot exhaust pipes, on aircraft for instance, is lessened by a new coating, Prof. Dwight G. Bennett of the University of Illinois told the American Ceramics Society in Atlantic City, N. J. It is the result of war time research to kill the visible red and invisible infra-red glow of bomber exhausts that would allow the enemy to detect the plane.

The coating contains uverite, a commercial product compounded from oxides of calcium, titanium, and antimony. A top coat of this over a base ceramic coat provides heat insulation, radiation reflection and radiation suppression. It protects the metal from the hot gases, and allows it to operate at a lower temperature. The coating kills 90% of the visible glow and the infra-red radiation.

Science News Letter, May 3, 1947

ELECTRONICS

Microwave Beacon to Guide Ships from Lighthouse

➤ THE FAMILIAR lighthouses that mark American coasts may soon send out invisible radio signals to guide ships at sea, as well as the present visible flashing light. A new electronic beacon for the purpose has been revealed by General Electric.

Microwave beacons they should be called, because they use this exceedingly short wave which, like radar pulses, travels unhindered through fog, rain, snow and sleet. A unit, built for the U. S. Coast Guard, will be tested early in May at New London, Conn. Its signals will be receivable only on radar-equipped vessels. The signals will appear as a bright ray on the ship's radar indicator, showing the exact direction of the beacon in the same way that the lighthouse is located by its beam of light.

The beacon equipment consists of two main units, the transmitter and antenna. It beams the radar waves in all directions from a vertical dipole antenna that resembles a policeman's nightstick in shape. One lighthouse tube powers the unit. The beams are in the 3,200 megacycle range.

Science News Letter, May 3, 1947

ASTRONOMY

Sun Will Be Blotted Out

Moon will come between the earth and sun on May 20 for fortunate observers in path of totality. Expeditions of astronomers to observe eclipse.

By MARTHA G. MORROW

▶ THE MOON will come between the earth and the sun late this month, completely blotting out old Sol's bright disk for the fortunate few who are within the path of totality. On Tuesday, May 20, the shadow cast by the moon will sweep down upon the earth.

At least a partial eclipse will be visible generally over all of South America except parts of Ecuador, Colombia and Venezuela. Varying amounts of the sun will be hidden for seafaring observers in the Atlantic Ocean between South America and Africa.

People in all of Africa except the northern tip of Tunisia will see at least some of the sun hidden by the moon. Those nearer the path of totality will see more of the disk blotted out. Partial phases of the total solar eclipse will be visible for observers near the Red Sea in southern and western Arabia, and the western half of Madagascar.

Not Visible Here

But not even a partial phase of the eclipse will be visible in North America, or in Europe, except for extreme southern Spain. So astronomers, anxious to witness the total eclipse in all its glory, have made their way to South America and Africa to observe nature's grandest spectacle.

The path of the total phase of the eclipse, about 84 miles wide at this point, will touch the earth at sunrise off the coast of Chile, and race across the Andes. From there it passes over Mendoza in the western highlands of Argentina and through the Cordoba hills. The sun now has an altitude of 8½ to 13 degrees, and the path has widened slightly. Totality will last between two and one-half minutes, and two minutes 40 seconds, according to calculations made at the Nautical Almanac Office of the U. S. Naval Observatory.

The Brazilian highlands, in the states of Sao Paulo and Minas Geraes, are considered the most favorable location in South America for the observance of the eclipse. At Sao Salvador, close to the central line, the total eclipse will last four minutes 14 seconds. This is within several seconds of the maximum duration for any place in South America. The sun will be fairly high at mid-totality.

Totality will last the longest, five minutes 14 seconds, at a point on the Atlantic at latitude one degree 22 minutes north, and longitude 19 degrees 15 minutes west. No islands in the South Atlantic Ocean, however, lie within the path.

Duration of Eclipse

Early in the afternoon the dark shadow cast by the moon will touch the coast of Liberia to the south of Monrovia. The duration of the total eclipse here will be about four minutes 54 seconds, in the center of the path, with the sun almost 60 degrees high. From this point the path continues along the south coast of the equatorial bulge of Africa, through Liberia, the Ivory and Gold Coasts.

Sweeping from Nigeria to the Cameroons, the eclipse crosses French Equatorial Africa and the Lake Plateau regions of the Belgian Congo, Uganda and Kenya. The moon's shadow leaves the earth at sunset south of Nairobi. The path gradually narrows from 112 miles on the coast of Liberia to about 80 miles at sunset, and the duration of totality decreases from about four minutes 58 seconds, early in the afternoon for those off the coast of West Central Africa, to about two and a quarter minutes at sunset.

Simultaneous observations of the total eclipse will be made from stations near Montes Claros, Brazil, and on the Gold Coast region of South Africa. Astronomers from Sweden's three most famous observatories, Stockholm, Uppsala and Lund, will make observations expected to add not only to our knowledge of the sun and the moon, but to give us more exact information about the earth itself.

The first appearance of the flash spectrum, caused by light from the sun's outer envelope and visible only at the very beginning and end of a total eclipse, will be accurately clocked at both stations. More exact calculations than previously possible of the longitude of the two observation points will be made from these data.

Expeditions will be sent to the two coasts under the auspices of the Geodetic Survey of Sweden. Preliminary work on the flash spectrum was conducted under the direction of Dr. Bertil Lindblad, director of the Stockholm Observatory, during the last total eclipse, that of July 9, 1945.

Brown University and the Skyscrapers, Rhode Island astronomical organization, are jointly sponsoring an expedition to Brazil. Araxa, about 300 miles northwest of Rio, is the chosen observation site.

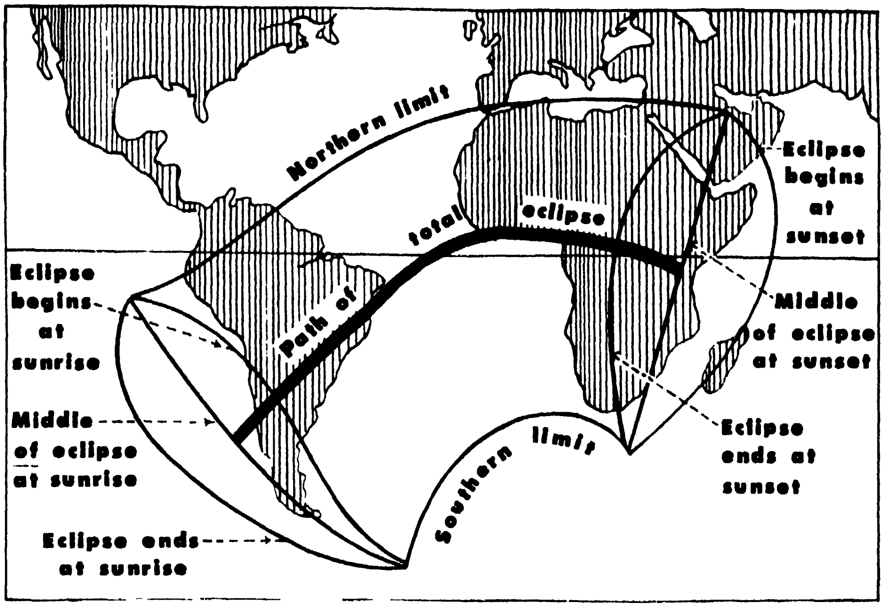
The eight experienced eclipse observers, led by Prof. Charles H. Smiley, left Providence a few weeks ago. En route by ship to Rio de Janeiro, Prof. Smiley "shot the sun" to acquire new solar refraction data that promise to save the lives of lost polar explorers of the future.

Measurements made during the past three years of the flattening of the sun near sunrise and sunset have laid the groundwork for tables showing by what amount observations of the sun, moon, planets and stars near the horizon must be corrected because of atmospheric refraction. Observations made during this journey complete sunrise and sunset studies for all latitudes from the tropical to the frigid zone.

Large Expedition

An elaborate expedition is being sponsored by the Army Air Forces and the National Geographic Society. Most of the scientists have already reached the "eclipse town" near Bocayuva, about 400 miles north of Rio de Janeiro. Here the total eclipse will last three minutes 48 seconds, and the chances of clear weather are good.

Additional groups participating in the expedition include scientists from the National Bureau of Standards, Lick Observatory of the University of Cali-



ECLIPSE OF SUN—Extent of the eclipse of May 20, with the path of totality, is shown as calculated by the U. S. Naval Observatory.

fornia, Yerkes Observatory of the University of Chicago, Georgetown Observatory, U. S. Naval Research Laboratory, Bartol Research Foundation and the National Broadcasting Company. Including doctors and cooks, the personnel of the party numbers around 75.

Scientists in the expedition hope to complete a number of objectives, and bring home much information for later analysis. The sun's pearly corona, visible at totality, will be photographed in black and white, and also in color. Photographs are to be obtained showing the polarization of corona light. Two specially built spectrographs will be used for studying the flash spectrum and the corona.

Brightness Variation

Variation in the brightness of the crescent of the sun as totality is approached will be measured, as will the exact times at which the moon makes the four contacts with the sun's disk. The distribution of daylight intensity at various altitudes during the eclipse will be studied. Radio observations of changes which take place in the ionized layers of the earth's atmosphere will be made.

Geiger counter apparatus, specially built for the expedition, will be used to measure the intensity of the hard component of cosmic rays, known as mesotrons. During the eclipse a "cosmic ray flying laboratory" will fly over the Bocayuva area, obtaining cosmic measurements. Additional tests will be made from the camp-site where recording instruments will be sent to heights of over 12 miles by radiosonde balloons.

Einstein's famous theory of relativity will be given a new and painstaking test to determine whether light rays from certain stars are bent as the rays pass near the sun on their way to the earth. A total eclipse of the sun offers the only opportunity to make this test, as ordinarily the light of stars in the same direction as the sun is drowned out by the sun's glare.

Astronomers at other eclipses during the last three decades have measured the apparent displacement of the stars close to the sun, but their pictures showed that the light rays, from the stars were bent by varying amounts. This time the temperature and pressure at high altitudes will be measured to determine how much of the bending of the light is caused by the earth's atmosphere.

A specially equipped airplane will make a series of photographs of the eclipse from an altitude of 30,000 feet, far above the region where possible clouds might interfere. An attempt will also be made to photograph the moon's shadow as it races across the earth.

Back in the United States, where not even a partial eclipse will be seen, the sun will be watched closely by a few astronomers in Climax, Colo. At the High Altitude Observatory of Harvard University and University of Colorado, man-made eclipses will be created with the coronagraph. The sun's corona and prominences at the time of the eclipse will be photographed for comparison with photographs taken by eclipse expeditions.

Other Expeditions

Other countries throughout the world are also planning expeditions. Dr. F. R. Link of Prague, Czechoslovakia, expects to observe the eclipse from Araxa.

Astronomers in South America are also planning to take advantage of the near-by eclipse. Two parties of Brazilian astronomers will observe the eclipse from points near Araxa and Lassance. Of the three parties planning to observe from Argentina, none will represent foreign groups.

An expedition, under the direction of Dr. Enrique Gaviola, from the Argentine National Observatory at Cordoba, is expected to make its headquarters about 50 miles north of Cordoba. A group from the La Plata Observatory, probably headed by Dr. C. V. Cesco, will locate near Corrientes, in northern Argentina near the border of Paraguay, or at Tostado, southeast of Corrientes. This party may divide its work between the two sites. A group representing the Asociacion Argentina "Amigos de la Astronomia," under the leadership of Dr. B. H. Dawson, will observe the eclipse at Itati, also in northern Argentina near Paraguay.

Scientists who have spent many weeks preparing for the eclipse and have traveled many weary miles to a favored location are hoping for clear skies. Their friends throughout the world trust that Operation Eclipse, anxiously awaited and lasting only a few minutes at best, will succeed.

Science News Letter, May 3, 1947

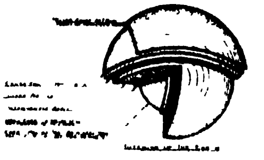
PHYSICS

Doctor's Stethoscope Has Amplifier Built into It

➤ A LISTENING instrument is covered by patent 2,419,471, taken out by Merle F. Thibos of Niles, Mich., on a physician's stethoscope with a radio-like amplifier built into it. Microphone, tubes, batteries and all other necessary parts are packed into a container about the size of a pocket flashlight, so that the apparatus is readily portable and not cumbersome to use.

Science News Letter, May 3, 1947

Early fruiting of *tomatoes* is discouraged by pinching off the tops of the vines; the first fruits form on the main stem.



Atoms, Planets & Stars

A DRAWING TO SCALE
(SIZE 23" x 48")

Dr. Albert Einstein Wrote as follows:

"I was extremely pleased to receive your beautiful drawing which gives a vivid representation of our solar system. I have hung it on the wall of my room to look often at it. Sincerely yours,"
A. EINSTEIN

"The drawing is excellent and informative. You certainly have given an enormous amount of information in a limited space."—DR. FOREST RAY MOULTON.

"I have never before seen the various features of the solar system and the earth shown so skillfully."—DR. M. M. LEIGHTON, Univ. of Illinois.

A Graphic Representation Covering the Following:

1—The solar system to scale and the movements of the planets, etc.
2—A "Time Table" for rocket ships showing arrival time from the planet Earth
3—The Elements, giving the melting and boiling points, density and atomic weights.
4—Comparative size of the sun to the orbit of the moon around the earth.
5—Comparative size of the star Betelgeuse to the orbits of the planets
6—Sectional view thru the earth showing the pressure at earth's core, etc.
7—Twenty of the brightest stars and their distances.
8—Our solar system in a nut shell. Shows our relative distance to other stars.
9—Our location in the Milky Way Galaxy, and time to reach nearest star.
10—Curvature of the earth with comparative heights and depths.
11—A drawing showing the way of measuring the distances to near stars.
12—Showing movement of comet tails, and their paths thru outer space.
13—The Moon. Temperatures, distance, diameter and other information

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PHOTOGRAPHY

Heavy-Weight Camera Makes Picture in Minute

➤ A HEAVY-WEIGHT camera, complete with developing and fixing equipment, that made it possible to see pairs of photographs one minute after they were taken, was developed during the war.

Details of the 100-pound camera were released recently in a report made public by the Department of Commerce. The camera was built by the Kannestine Laboratories in Houston, Texas, for the wartime office of Scientific Research and Development.

The wartime camera was designed for reconnaissance work. The shutter and film operated automatically by an electric motor while the observer concentrated on watching the negatives. A stereoscopic device was used to view the pictures after the exposed film was held in the developer tank for about a minute.

The report issued recently suggested several improvements needed to perfect the big camera. Greatest disadvantage is the weight.

Earlier this year, Edwin H. Land of the Polaroid Corporation, Cambridge, Mass., announced the development of a process for producing a finished picture in one minute. This process was claimed to be adaptable to small cameras. (See SNL, March 3).

This report, PB-51003, may be obtained from the Office of Technical Services, Department of Commerce, for $1.00 on microfilm.

Science News Letter, May 3, 1947

PLANT PHYSIOLOGY

2,4-D Can Blight Plants Before They Are Born

➤ PLANTS can be blighted by the killer-chemical, 2,4-D, even before they are born. Dr. A. M. S. Pridham, Cornell University horticulturist, sprayed some plants of red kidney bean with 2,4-D while their pods were ripening. Seeds from these pods were planted, and produced a new generation of plants that had all the crippled appearance of plants that had been directly attacked with the chemical. Offspring of unsprayed plants kept as controls remained perfectly normal.

Science News Letter, May 3, 1947

Do You Know?

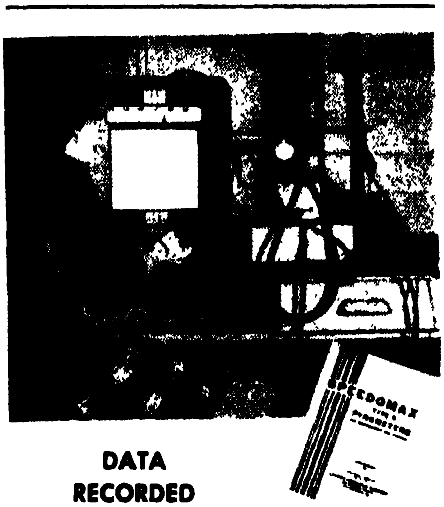
Egg whites before whipping should be at room temperature; they whip up more quickly and expand to greater volume.

Surfaces should be cleaned before *painting;* paint and dirt can be mixed but they make an unsightly, streaky mixture.

"Positex", a new British-developed form of rubber latex, is used to treat soft twisted *yarn;* it gives it the tensile strength of hard twisted yarn.

Man and certain species of ants are the only two members of the animal kingdom that wage *war* in battle formation; other animals fight duels or sometimes engage in gang fights.

Less than one-third of American *farms* are now operated by tenants; farm tenancy has decreased 7% since 1940.



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ENGINEERING

Chemical Tests for Rocks

➤ STRONG ROCKS do not always make good concrete, and weak rocks do not always cause deterioration, the American Society of Civil Engineers in Phoenix, Ariz., was told by R. F. Blanks of the U. S. Bureau of Reclamation. Chemical tests of the rocks, he indicated, are necessary.

He described a research project now nearing completion in the Bureau's laboratories which has evolved a quick chemical procedure which provides a degree of assurance against misbehavior of the rock used in concrete as an aggregate, or filler, when in company with the other ingredients used.

Present standard tests, he said, are designed to determine the quality of aggregate as rock, not as a component of concrete. The difficulty is the concept that strong and durable rock necessarily contributes to strength and durability in concrete, and that weak rocks directly contribute to unsoundness.

Highway Paving

"Tailor-made" highway pavements to meet climatic, traffic and subsoil conditions are necessary, the engineers were told by Donald J. Steele of the U. S. Public Roads Administration.

While reporting some progress in formulizing types of pavement surfaces and subsurfaces, he emphasized that the selection of types and thicknesses of both should be governed by the volume and weight of traffic to be carried. Concrete slabs today average about eight inches, but tops only four or five inches thick, built 25 to 35 years ago, are still in service because of their good foundations.

Thicknesses of surface slabs as high as 10 inches of reinforced concrete have proved deficient when placed on fine-grained soils instead of coarse granular material. The available evidence, he declared, indicates that the greatest single cause of pavement failures in the past has been lack of adequate substructure.

Science News Letter, May 3, 1947

PSYCHOLOGY

Americans Worry Too Much About Mental Diseases

➤ IF YOU HAVE ever thought: "Am I going crazy?" here is reassurance:

Americans worry too much about mental disease, Dr. C. Charles Burlingame, president of the Institute of Living, formerly known as the Hartford Retreat, warned. And we may be developing a "national schizophrenic personality."

People are bewitched by psychiatric jargon and see mental disease in perfectly normal emotional swings. Unless this dangerous preoccupation is stopped, Dr. Burlingame told the board of directors of Connecticut's oldest mental hospital, thousands of Americans will be looking for help from mental specialists.

The vast majority will never have the opportunity to get within speaking distance of a psychiatrist, even to be reassured that they have no budding serious mental disease. There are only 4,000 psychiatrists to take care of advising all the worried people in the country, and only 2,500 of these are certified by the American Board of Psychiatry and Neurology.

"We have been talking a good deal about taking a leaf from the book of the tuberculosis and cancer movements," said Dr. Burlingame, "preaching that mental illness must be attacked, like tuberculosis and cancer, through a national alertness to early psychiatric disorders."

But the man who thinks he may have signs of tuberculosis or cancer can get a physical checkup promptly. The person who fears he has mental symptoms is not going to be so lucky.

Explaining the developing of a possible "national schizophrenic personality," Dr. Burlingame observed that "schizophrenic" means "a splitting of the personality," and Americans are split between group generosity and individual selfishness.

"On one side, we, as a nation, are extolling the need for love and light and philanthropic kindliness around the world, while on the other side we, as individuals, are basing our entire existence on the precept of 'What do I get out of it?'"

He urges a new appreciation of spiritual values and teaching children social responsibility through the establishment of "parentoriums." These would be parent guidance centers, not necessarily related to sickness of any kind.

Science News Letter, May 3, 1947

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Be Careful!

➤ WILDFLOWER species are a lot like human beings in many respects. Some are adaptable, easy-going, even tough—they can stand almost anything. Others are delicate, sensitive, failing to thrive if their environment is disturbed, even likely to die if they are moved into a strange and unaccustomed place.

Many enthusiastic gardeners perennially get the idea that they would like to have a little corner of their home grounds devoted to a wildflower garden. This is all very well for some species: violets, wild iris, wild lilies, goldenrod, wild asters and a lot of other worthwhile plants will as a rule not resent being kidnaped and set down in a new place. If conditions of soil, moisture and light or shade even approximate those of their old homes they will take hold and thrive very well.

However, there are many other plants to which the average transplanting operation is an almost certain death sentence. Unfortunately, many of these are just the flowers one is most likely to fall in love with and desire to have at home, to see every day—such beautiful things as trillium, lady's slipper, dogtooth violet, twinleaf, fringed gentian and the more delicate kinds of fern. One of the earliest and sweetest-scented of wildflowers, the trailing arbutus, has been completely exterminated over large stretches of its former range by ruthless market-hunters who offered the plants for sale to set out in gardens that could not offer proper living conditions, and where they very soon died.

Only professional botanists, trained horticulturists, or long experienced gardeners have any natural right to attempt the transplantation of the more sensitive wildflower species. They have learned to judge habitat conditions—even to measure them with scientific instruments in many instances—before expecting some strange and timid beauty to settle down and live in them.

The home gardener who has "had good luck" with familiar cultivated flowers like nasturtiums, marigolds, zinnias and hollyhocks must always remember that these are the end-products of long generations of selection for toughness and adaptability. Many of them are even able to survive as semi-weeds if left to themselves. Success with them gives no license to attempt the much more exacting task of taming wildflowers.

Science News Letter, May 3, 1947

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WYOMING

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PSYCHOLOGY

Why Fighter Pilots Crash

➤ WHEN FIGHTER pilots crash during training due to their own fault, psychologists find the cause may be:

Miscalculation of speed and distance.

Bad planning of the flight.

Not paying attention to the right thing at the right time.

Recklessness.

Not reacting correctly to an emergency.

It was easier than they expected it would be for four Army psychologists to tell what was the pilot trouble in 200 such accidents at Mitchel Field, N. Y., in eight months.

Drs. Richard H. Henneman and Howard J. Hausman of the Strategic Air Command, told the Eastern Psychological Association meeting in Atlantic City, N. J., that such study of accidents will help select better pilots, suggest better methods of training and improve design of equipment.

Mechanical Know-How

➤ THAT MECHANICAL know-how that the Army found during the war was so important to success as an airplane pilot is really a combination of four independent abilities, Dr. Frederick B. Davis, of the Office of the Air Surgeon, told the meeting.

Pilots have to have an aptitude for mechanical work, be handy with words, be able to use mechanical devices, and know physics. Other factors are also involved, probably eight in all, but these four account for 82% of the difference between individuals in "mechanical comprehension," as this know-how is called.

Mechanical aptitude, one of the factors, is probably also made up of more than one ability. Studies are now being conducted to find out just what it is.

Science News Letter, May 3, 1947

GENERAL SCIENCE

Nations Agree in Science If Not Always in Politics

➤ SCIENTIFIC cooperation is possible between nations that cannot get along together in other fields, Dr. Arthur H. Compton, chancellor of Washington University, declared before the meeting of the American Philosophical Society in Philadelphia. The proper medium for such cooperation is UNESCO, the educational, scientific and cultural arm of the United Nations.

"Where two nations have ideologically differences that bring danger of wars, many types of interchange of ideas are unwelcome or subject to suspicion," Dr. Compton pointed out. "This applies in particular to the use of radio and the press, to the control of basic education and to religious and philosophical thought. No such difficulty exists in the field of science. Since for securing the peace of the world it is precisely between nations with such differences that it becomes most important to obtain understanding and cooperation, scientific education and research become leading aspects of UNESCO's task."

Science News Letter, May 3, 1947

• Books of the Week •

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AND THE MOUNTAINS WILL MOVE—Capt Miles P. DuVal, Jr.—*Stanford Univ. Press*, 374 p, illus., $5. This story of the epic struggle to build the Panama Canal concerns itself with three phases: the building of the Panama Railroad; the French effort; completion of the Canal by the United States.

CLINICAL ALLERGY—Alexander Sterling—*Int. Univs. Press*, 198 p., illus., $5 For general practitioner and student, this monograph is on the management and treatment of allergic diseases.

CUMULATIVE CATALOG OF LIBRARY OF CONGRESS PRINTED CARDS—*Library of Congress*, $100 a year To be printed in 9 monthly issues, three quarterly cumulations and an annual cumulation, this catalog is within the financial reach of many libraries unable to support card depository sets. It is an author catalog.

DISCOVERING OUR WORLD, Books One and Two—Wilbur L. Beauchamp, Mary M Williams, Glenn O. Blough—*Scott*, Book One, 224 p, illus., $1.48, Book Two, 256 p., illus, $1.52. For the middle grades, these excellent texts introduce the child to the world of science in which he lives

THE ETHNOGEOGRAPHIC BOARD—Wendell Clark Bennett— *Smithsonian Inst.*, Misc. Col Vol. 107, No 1 Pub No 3889, 134 p., paper, 65 cents. An historical survey of the work of this wartime organization whose purpose was to make available to military and war agencies specific regional information and evaluated personnel data available to the sponsoring institutions.

ESSAYS IN SCIENCE AND PHILOSOPHY—Alfred North Whitehead — *Philosophical Lib.*, 348 p., $4.75. Biographical sketches, thoughts on learning, and some basic theories in mathematics.

THE FLYING NORTH—Jean Potter—*Macmillan*, 260 p, illus., $3.75. This is the story of the conquest of the north by airplane and of the men who did it.

FRANCIS DRAKE AND THE CALIFORNIA INDIANS, 1579—Robert F. Heizer—*Univ. of Calif.*, Publ. in Am. Archaeology and Ethnology, Vol. 42, No. 3, 50 p, illus, paper, $1.25, cloth, $2. Attempts to solve the puzzle of the exact location visited by Drake by identifying the particular Indian tribes he describes in his account.

GUIDE TO INFORMATION ABOUT SWEDEN —Naboth Hedin—*Am. Swedish News Exchange*, 61 p., paper, 25 cents. A bibliography designed to make it as easy as possible to find information in English about modern Sweden.

THE HIVE AND THE HONEYBEE—Roy A Grout, ed.—*Dadant*, 633 p., illus., $4. With chapters written by specialists, this manual of bee-keeping considers every aspect of the problems of caring for a honeybee colony, preparing the honey and beeswax, and also history, anatomy and genetics of the bee.

HOW TO TUNE UP YOUR AUTOMOBILE—Jack Steele—*Henley*, 239 p., illus., $2.50. A practical, everyday guide to help both mechanics and owners care for cars.

IF YOU NEED AN OPERATION—Richard A. Leonardo—*Froben*, 198 p., $3. By describing several common uncomplicated operations, this book attempts to relieve the general public's fear of operations and help people to prepare themselves intelligently for the elective ones.

LABOR FORCE DEFINITION AND MEASUREMENT. Recent Experience in the United States, *Social Science Res. Council*, 134 p., paper, $1. Prepared for the Subcommittee on Labor Force Statistics of the Committee on Labor Market Research.

LEONARDO DA VINCI · A STUDY IN PSYCHOSEXUALITY—Sigmund Freud; trans. by A. A. Brill—*Random House*, 121 p., $2.50. Written 40 years ago to defend psychoanalysis, this text, with Brill's introduction, points up the long road traveled in understanding.

MULTIPLE FACTOR ANALYSIS—L. L. Thurstone—*Univ. of Chicago Press*, 535 p., $7.50. A technical work on mathematical psychology, developing and expanding the author's well known *Vectors of Mind* and presenting his method for appraising the abilities of the individual.

NORTHERN FISHES With Special Reference to the Upper Mississippi Valley—Samuel Eddy and Thaddeus Surber—*Univ. of Minn.*, 2nd. ed rev., 276 p., illus., $4. For sportsman, ichthyologist and conservationist this study describes over 150 fresh-water fishes.

PHYSICS EXPERIMENTS AND PROBLEMS—A. J. Burdick and J. J. Dudleston—*Singer*, 183 p., illus, paper, $1. Intended for eleventh and twelfth year high school students, this book of experiments is adapted for use with any textbook.

SALAMANDERS, TOADS, AND FROGS, N Y. *State College of Agric.*, Cornell Rural School Leaflet Vol. 40, No. 4, 31 p, paper, 10 cents. A helpful guide to the recognition of these little creatures that live near springs.

SUGARS AND SUGAR DERIVATIVES IN PHARMACY—Paul S. Pittinger—*Sugar Res Found.*, 54 p., illus., paper, free. Valued for a variety of properties and functions, sugar is consumed in the pharmaceutical industry at the rate of over 60,000,000 pounds a year.

TUNGSTEN: Its History, Geology, Ore-Dressing, Metallurgy, Chemistry, Analysis, Applications, and Economics—K. C. Li and Chung Yu Wang—*Reinhold*, 2nd ed. rev., 430 p., illus., $8.50. This American Chemical Society Monograph is a timely and comprehensive discussion of this useful and strategic metal.

A YANQUI IN PATAGONIA—Bailey Willis—*Stanford Univ. Press*, 152 p, illus., $3. Planning a city to order in a remote lake and mountain region became the task of the author, who had gone to Argentina in search of prehistoric man.

Science News Letter, May 3, 1947

PHYSICS

Burning Building to Give Fireproofing Information

➤ THERE'S GOING to be a fire at the National Bureau of Standards in Washington. It won't be a four-alarm affair as it would be if scientists weren't setting it purposely. (Any fire alarm from the government's great research laboratories calls out apparatus equivalent to four alarms).

Furniture and typical office equipment will be placed in a special concrete and cinder block building, now under construction. When the arsonist-engineers apply the scientific torch in about two weeks, temperature measuring devices buried in the office will tell just how hot it gets.

The idea is to find out how high a temperature must be resisted in order to keep fire from spreading. The information will be used in designing more fireproof walls and equipment.

Science News Letter, May 3, 1947

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⚙ *ADJUSTABLE weight devices, for use on golf clubs with aluminum heads, are aluminum plugs that screw into the under face of the club and enable a player to get just the balance desired. The plugs can be unscrewed with a coin, and additional weights added if wanted.*

Science News Letter, May 3, 1947

⚙ *METER, to locate faulty bonding in plywoods, veneers and other laminated construction, is a cylindrical can with a window on the top and a gage within. In use, it is pressed against the material, and the air within removed. A fault in the bonding contains air, which will cause a bulging under the can sufficient to register.*

Science News Letter, May 3, 1947

⚙ *ELECTRIC LAMP of the incandescent type, recently patented, has a bulb made by joining together two or more sections of different colors to give various color combinations. When lighted in a vertical position, for example, a red light shines on one side, a green light on the other.*

Science News Letter, May 3, 1947

⚙ *KETCHUP dispenser, for table use, applies the tomato sauce in the quantities desired by use of a plastic pump that fits on any popular brand ketchup bottle. Thumb pressure on the head of the dispenser operates a piston that forces the ketchup up a central tube and out a nozzle on the side.*

Science News Letter, May 3, 1947

⚙ *INTEROFFICE conversation equipment, with a single amplifier installed in any out-of-the-way place, uses only a small speaker unit, shown in the picture, on each office desk. The equipment, with 100 feet of connecting wire, is designed for two-station use, but as many as five stations can be used with the amplifier.*

Science News Letter, May 3, 1947

⚙ *HEXAGONAL steel fixtures, designed to clamp on carpenters' steel squares, assist mechanics in laying out many types of angles. The slotted fixture is held in place on the straight-edge of the arm of the square with a thumb screw, its projecting side giving the angle desired.*

Science News Letter, May 3, 1947

⚙ *SHINGLE gages that fit on a shingler's hatchet, enable carpenters to lay shingle courses accurately and rapidly. They are slotted pieces of round metal that can be fastened firmly to the hatchet blade with a set screw.*

Science News Letter, May 3, 1947

⚙ *COFFEE vending machine, operated by a nickel-in-the-slot device, can produce a fresh cup of highest quality blended coffee, steaming hot, every five seconds. The coffee is delivered in a sanitary paper cup. Sugar, cream and spoon are added, if desired, by pushing special buttons.*

Science News Letter, May 3, 1947

Question Box

AERONAUTICS
What is unusual about the wings of the plane on the cover? p. 276.

ASTRONOMY
Where will observers be able to see the eclipse? p. 282.

BIOPHYSICS
How much energy do you burn sitting still? p. 279.

BOTANY
What wildflowers can be transplanted? p. 286.

CHEMISTRY
How does onion juice mixed with 2,4-D affect plants? p. 280.
What has made heavy oxygen available? p. 279.

DENTISTRY
What chemical is a possible preventive of tooth decay? p. 274

HISTORY OF SCIENCE
Who started scientific cooperation with Russia? p. 277.

PHYSICS
What is the compound that responds to a temperature change of one ten-millionth of a degree? p. 281.

PSYCHOLOGY
Why do fighter pilots crash? p. 286.

PUBLIC HEALTH
Why are epidemics becoming more threatening to the nation? p. 276.

WOOD TECHNOLOGY
Of what kind of wood will the decks of future battleships be built? p. 278.

Pictures: *Army Air Forces, cover, p. 275; Brookhaven National Laboratory, p. 277; John W. Mitchell, p. 279.*

Where published sources are used they are cited.

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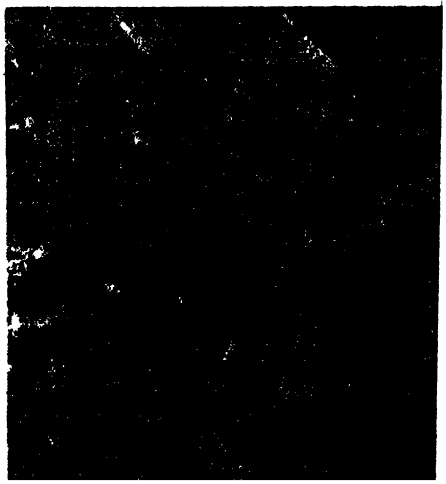

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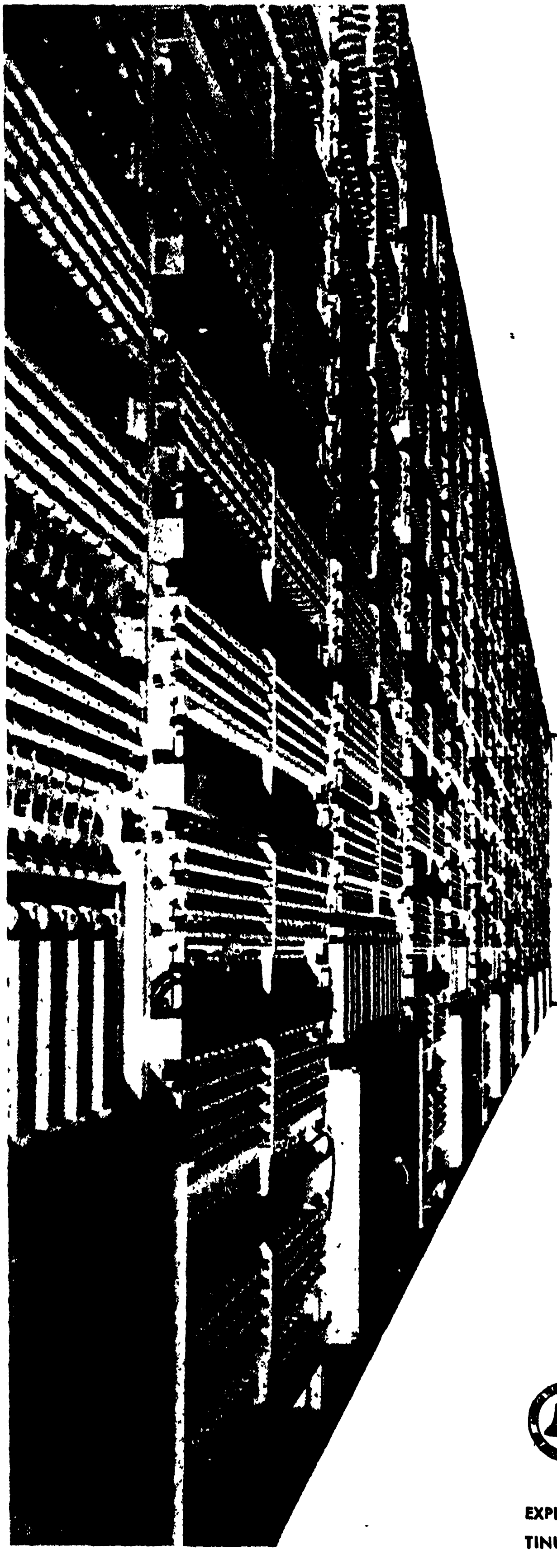
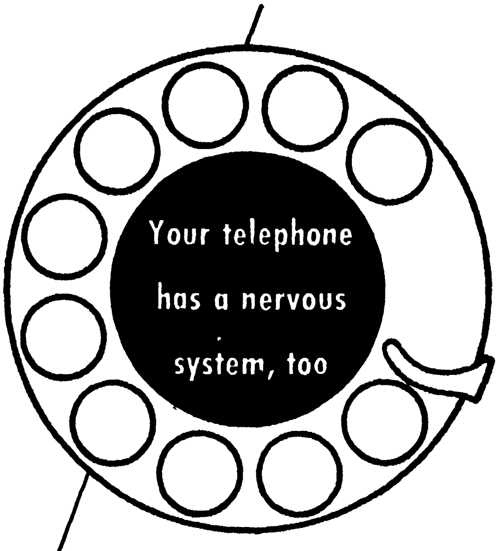




WHEN you spin the dial of the latest type of telephone system — known as "common control switching" — you order into action a giant nervous system. It sends electrical impulses through an intricate maze of circuits: more than 10,000 contacts can be opened or closed in a single dial call.

This system takes your order, remembers it, translates it into its own electrical language, throws out sensitive "feelers" to find a through route, plans how to make the connections, makes them, puts through the call—and, if the preferred paths are busy, finds an alternate route to take the call.

The complex art of telephone switching is brought to a high state of development at Bell Laboratories to serve the Bell System. Some day through "common control switching" a dial in San Francisco may set up a connection through to a subscriber in New York.

■

Left: Backstage on your dial telephone call —some equipment in a typical "common control switching" office.

Bell Telephone Laboratories

EXPLORING AND INVENTING, DEVISING AND PERFECTING FOR CONTINUED ECONOMIES AND IMPROVEMENTS IN TELEPHONE SERVICE

7 JUL 1947

MEDICINE

Operation Relieves Pain

Pain is still present after brain operation but patients don't mind it. Feelings about pain knocked out though sensation remains.

➤ A WAY to relieve unbearable pain and suffering that patients say is "worse than pain" has been discovered. It is a relatively simple and safe operation in which certain nerve paths in the brain are cut. It was described by Dr. Walter Freeman of Washington, D. C., at the meeting in Chicago of the American College of Physicians.

One patient, Dr. Freeman reported, was in the late stages of cancer. He was suffering hideous pain and each time the nurse gave him morphine, while the pain-killing drug was being injected, he was begging for another injection when the present one wore off.

After the operation, he never asked for morphine and lived comfortably without it until his death four months later.

A taxi driver making $100 a week was paying $80 a week for opiates to relieve the excruciating, lightning pains of tabes, late result of syphilis. After the operation, he got along without drugs, drove his cab regularly and when asked about the pains, said in an off-hand way, "Oh, I have twinges."

Pain that comes from mental causes as well as that from physical disease can also be relieved by the operation. Dr. Freeman cited the case of a middle-aged woman who had the melancholia or depression that sometimes comes to women of that age. She lamented almost constantly about unbearable pain from hemorrhoids which she did not have. While no physical condition to cause the pain could be found, there was no doubt that she was suffering real pain.

The day after the brain operation, in 1936, she felt fine. She returned to work and worked nine years until her retirement on her seventieth birthday. When asked about the hemorrhoids, she says she doesn't have any.

The operation relieves patients, Dr. Freeman explained, by knocking out the terror or other emotion the pain arouses. Many patients, such as those with cancer or tabes, still have pain. But they do not mind it.

Pain is made up of both sensation and feeling, he explained. A simple example is the case of a stubbed toe. The toe hurts, but the person also feels angry or resentful or perhaps humiliated. A person who has had the brain operation, which is called prefrontal lobotomy, feels the sensation of pain but not the anger, fear or resentment. So he can bear the pain.

Library.

At the operation, the surgeon cuts through the frontal lobes of the brain. These parts of the brain are apparently essential for foresight and insight, or understanding of oneself. But the emotional charge that gives these faculties color, makes them come alive and determines how a person acts, apparently comes from another part of the brain called the thalamus.

After the lobotomy operation, the brain cortex is practically unchanged, but the thalamus, sometimes called the seat of the emotions, shrivels and dies. As a result, there is no charge of feeling about oneself or what happens to the self. In fact, many of the patients have to be reeducated, as children are trained, to take ordinary care of themselves and precautions for their safety in traffic or the like.

The operation was originally devised to relieve the depression, worry and anxiety of mental patients. Dr. Freeman sometimes used to say that the operation removed the "worry center," although no part of the brain was actually removed. All that is done is to cut through certain nerve paths.

It should, Dr. Freeman believes, be more widely used to relieve unbearable pain.

Science News Letter, May 10, 1947

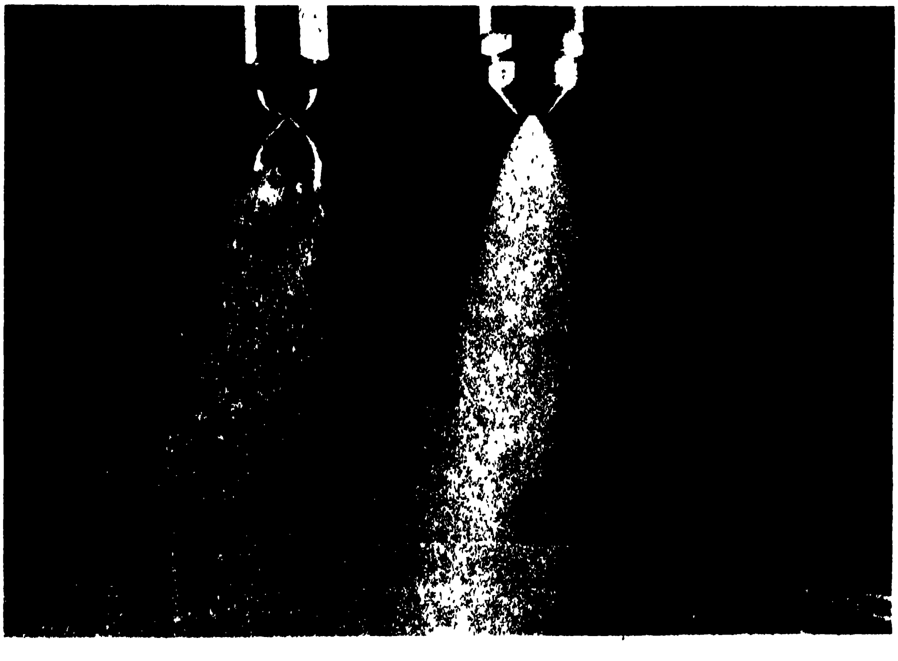
ENGINEERING

New Fuel Atomizer Turns Heavy Oil into Fine Spray

➤ A VAPOR-FINE spray from a new fuel atomizer that whips heavy oil into tiny droplets will speed the development of new gas turbine engines.

The atomizer is a new-type nozzle, designed by K. V. Smith, Westinghouse research engineer, that sprays oil into the engine in a miniature cyclone of oil particles averaging less than four ten-thousandths of an inch in diameter. With it, 96% of the oil is converted into heat over a wide range of speeds, at times reaching heat-producing efficiency twice that of other nozzles.

This is possible, Dr. Stewart Way, Westinghouse supervisor of combustion research, states, because the tiny wind-driven droplets vaporize and burn more readily than the spray from con-



FUEL ATOMIZER—The new type nozzle, right, sprays oil in a minature cyclone of vapor particles. It is compared to the conventional nozzle on the left.

ventional nozzles, which produces fuel particles some 10 times larger.

Key to the new nozzle's atomizing power is a blast of air that enters through six pin-hole slots cut at an angle in the nozzle. As these separate streams of air enter the atomizer, they set up the whirl that causes the fine spray. The device is to be used on a 2,000-horsepower oil-burning gas turbine now under experimental development. This turbine is considered promising as a possible drive for locomotives.

Science News Letter, May 10, 1947

CHEMISTRY

Leftover Heavy Water

Deuterium oxide from the atomic bomb project will be sold at $15 an ounce for research. It slows down fast neutrons that "trigger" atomic bombs.

➤ HEAVY WATER being sold by the Atomic Energy Commission for research purposes is really a sale of leftovers from the atomic bomb project.

Deuterium oxide (that's what heavy water is chemically) is a material that slows down fast neutrons, the "triggers" of the atomic bomb or the chain reacting uranium pile. In American work on atomic energy, very pure carbon in the form of graphite was used as the "moderator" or slower-downer of the neutrons.

But the Germans planned to use heavy water for this purpose and a plant manufacturing it in Norway was the target for one of the most intensive bombing raids of the war. Evidently the Manhattan District hedged by producing heavy water for possible use as a moderator, because the scientists were not quite sure that the graphite would really work and time was more precious than money. Possibly some heavy water was used in some chain reacting piles, but details are still under wraps of secrecy.

Heavy water which has two atoms of double-weight hydrogen, called deuterium in its molecule (the rest being an atom of ordinary oxygen), will be sold to experimenters whose use of the precious stuff is approved by the Atomic Energy Commission.

An ounce will cost $15. An ounce of the liquid can be visualized as enough to fill what a barkeeper calls a jigger. The official price list reads 50 cents per gram for the first 100 grams. Deuterium as gas can also be purchased at a dollar a liter, which is somewhat more than a quart.

Heavy water has a molecular weight of 20 compared with 18 for ordinary water. This difference in weight is sufficient to be detected by a mass spectrometer in which instrument the path of the heavier atom is different in the magnetic fields than the ordinary light one. Light from a discharge tube containing deuterium is different from that containing hydrogen.

Just what happens to hydrogen in the human body or other living things will be studied through the use of the deuterium which is tagged because of its higher weight.

Science News Letter, May 10, 1947

PSYCHOLOGY

Neurotic Patients Present Great Challenge to Doctors

➤ "THE NEUROTIC patient cannot cure himself," Dr. William C. Menninger of Topeka, Kans., declared at the meeting in Chicago of the American College of Physicians.

Doctors do not ordinarily expect patients to cure themselves. But medicine has for a long time "failed to aid" the neurotic, Dr. Menninger stated.

As consultant on neuropsychiatry to the Surgeon General, U. S. Army, and member of the advisory board to the Secretary of War, Dr. Menninger saw the toll which psychoneurotic conditions took of men in the armed forces.

"The picture we saw in the Army must exist in modified form in civilian life, since our soldiers were primarily civilians," he pointed out.

"In any event, it presents a major challenge to American medicine upon which the health, both mental and physical, of our people depends."

Often patients with the beginning symptoms of serious mental illness are first seen by a throat specialist, a gland specialist, a bone and joint specialist or a specialist in internal medicine. Only when the symptoms become mentally incapacitating are they brought to the attention of the psychiatrist. Only then is their neurotic illness diagnosed primarily as such.

In many cases the first doctor the patient consulted might have checked or relieved the symptoms. In many other cases the patient might have had a better chance for recovery if he had been referred earlier to a psychiatrist.

"Neurotic patients can help themselves in their recovery," Dr. Menninger said, "but only after the doctor has stepped into their environment and helped them reestablish their equilibrium."

Science News Letter, May 10, 1947

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ENGINEERING

Pilotless Model Planes Get High-Speed Data

➤ MODEL PLANES of wood, without pilots or engines, are used by the U. S. Navy to secure data on flights at 600-mile-per-hour speed, it has been revealed. Carried aloft by other planes, they are freed, and attain their speed by diving.

These models are four-tenths the size of the Navy Bearcat fighter, F8F, and are exact copies in shape. Automatic controls pull them out of their dives at speeds in excess of 600 miles an hour, and parachutes lower them safely to the ground.

Each model plane carries radio telemetering equipment which transmits performance data to ground stations during their diving and pull-out flight. Radar tracking shows the path of flight, and automatic radio-transmission permits evaluation of behavior in the air.

Science News Letter, May 10, 1947

ENGINEERING

One Big Engine Is Made From Five Medium Ones

➤ MAKING one big engine out of five ordinary-sized ones is the achievement on which two Detroit inventors, H. T. Woolson and M. L. Carpentier, have been awarded U. S. patent 2,419,305, which they have assigned to the Chrysler Corporation.

Their invention, they state, is intended primarily for use in case of national emergency, when large-horsepower units would be needed faster than our automotive industry could tool up to produce them. We normally produce engines of moderate horsepower very rapidly and in great numbers, so that a practical method for building up big horsepower by piling one small engine on another might be highly valuable.

The design described and figured in the new patent calls for five ordinary automobile engines, complete except for their crankcases, set up on a common crankcase in what might be called a semi-radial pattern. The top engine stands vertical, the next pair down form a wide V, and the bottom pair are almost horizontal. All five deliver their power to a central shaft by means of gears. Ignition and cooling systems are little changed from those of individually run engines, but the oil system has had to be considerably rearranged.

Science News Letter, May 10, 1947

MODEL PLANES—Model planes which reach trans-sonic speeds are dropped from a mother plane to test conditions of flying near the speed of sound.

MEDICINE

Easy-to-Treat Headache

➤ A NEW HEADACHE, a hard one with a hard name but a simple treatment, came to light at the meeting in Chicago of the American College of Physicians.

The headache's name is "indurative" headache. Not even your doctor is likely to recognize it by that name, but he and you, too, may know it as tension headache. It seems to have been known under still another alias three centuries ago. Then it was called rheumatic headache.

In this kind of headache, the muscles of the neck and scalp are involved. The doctor, if he feels the head and neck carefully, can find tender spots in the muscles and even little lumps like knots. Along with the headache many sufferers have a slight rise in temperature in the afternoon.

This headache is being overlooked by many scientists who make a study of headaches, Dr. Herman Chor of Chicago pointed out. Injecting salt solution into the muscles will bring on pain in the head and scalp, he reported.

The treatment fortunately is very satisfactory. Massage and salicylates, best known to the laymen as aspirin, give very good results.

Science News Letter, May 10, 1947

Treatment for Light Bones

➤ OLD PEOPLE'S tendency to have light bones that may break easily can be counteracted by giving them sex hormones and protein foods such as meat and eggs, Dr. Fuller Albright, Harvard Medical School professor who was awarded the College's John Phillips Memorial Medal, reported. But it is not the slowing down of the sex glands in old age that leads to the change in the bones. There is another glandular slowing that comes with age. Unlike that of the sex glands, this glandular slowing comes at the same age in men and women. These glands are the adrenal glands.

Adrenalin is the best known of the many hormone chemicals they produce. They also, Dr. Albright reported, produce two chemicals which he labelled "N" and "S" hormones. The "N" stands for nitrogen and "S" for sugar. The "N" hormone is the important one in connection with the bones.

For the period when the adrenal glands slow down in producing this hormone, Dr. Albright coined the word "adrenopause." This comes later than the menopause, when the female sex glands slow down on hormone production.

The inactivity common among old people also leads to light, porous bones.

A feeling that the skeleton is unstable is the most fundamental stimulus for the cells that lay down new bone. And of course the skeleton of an active young man or woman feels more unstable to the bone-building cells than the skeleton of grandpa or grandma, who sits by the fire all day. By the same token, keeping old people in casts when they break their bones may slow knitting of the break because the bones in a cast are stable and the bone-building cells do not get the needed stimulus to work laying down new bones.

Milk, long rated as good bone-building food, appeared in a new light in view of Dr. Albright's studies. It is not the calcium but the protein in the milk that is important. Porous, light bones have plenty of calcium but lack protein to make them normally dense.

Science News Letter, May 10, 1947

GENERAL SCIENCE

National Academy Elects

Twenty-eight Americans and five foreign men of science were elected to the Academy. Dr. A. N. Richards will preside over the National Academy of Sciences.

➤ DR. ALFRED N. RICHARDS, elected president of the National Academy of Sciences for the next four years, which is top honor in American science, was the director of America's medical research during the war under the Office of Scientific Research and Development and the National Research Council. He is vice-president for medical affairs at the University of Pennsylvania.

Elected to the Council of the Academy for a three-year term were Dr. W. Albert Noyes, Jr., chairman, department of chemistry, University of Rochester; and Dr. Donald D. Van Slyke, chief chemist, The Hospital of the Rockefeller Institute for Medical Research.

Dr. F. E. Wright was re-elected home secretary for a further four-year term.

The following new members were elected to the Academy:

Luis W. Alvarez, professor of physics, University of California.

Robert F. Bacher, U. S. Atomic Energy Commission.

Paul D. Bartlett, professor of chemistry, Harvard University.

Jacob Bjerknes, professor of physics, University of California at Los Angeles.

Francis G. Blake, Dean of Yale University School of Medicine.

R. Alexander Brink, chairman of department of genetics, University of Wisconsin.

Ralph W. Chaney, professor of paleobotany and curator of paleobotany, Museum of Paleobotany, University of California.

Arthur C. Cope, professor in charge of department of chemistry, Massachusetts Institute of Technology.

Farrington Daniels, professor of physical chemistry, University of Wisconsin.

Arnold Gesell, director, Clinic of Child Development, Yale University School of Medicine.

James Gilluly, professor of geology, University of California at Los Angeles.

R. B. Goldschmidt, professor of zoology, University of California.

Samuel A. Goudsmit, professor of physics, Northwestern University.

C. H. Herty, Jr., research engineer and assistant to vice president, Bethlehem Steel Company.

Frederick L. Hisaw, professor of zoology, Harvard University.

Wolfgang Kohler, professor of psychology, Swarthmore.

L. G. Longsworth, associate member, Rockefeller Institute for Medical Research.

Edwin M. McMillan, professor of physics, University of California.

Walter J. Meek, acting dean, Medical School, University of Wisconsin.

J. L. Oncley, director, Ultracentrifuge Laboratory, Harvard University Medical School.

Lars Onsager, professor of chemistry, Yale University.

John P. Peters, professor of medicine, Yale University.

Paul A. Smith, professor of mathematics, Columbia University.

C. Richard Soderberg, professor of applied mechanics, Massachusetts Institute of Technology.

Paul Weiss, professor of zoology, University of Chicago.

F. W. Went, professor of plant pathology, California Institute of Technology.

Robert E. Wilson, chairman of Board of Directors, Standard Oil Company of Indiana.

E. Bright Wilson, Jr., professor of chemistry, Harvard University.

New foreign associates elected are:

P. A. Alexandroff, professor of mathematics, University of Moscow.

K. Linderstrom-Lang, head of the chemical division, Carlsberg Laboratory, Copenhagen, Denmark.

J. N. Bronsted, professor and director of the Institute for Physical Chemistry, Copenhagen, Denmark.

Bjorn Helland-Hansen, director, Geophysical Institute, Bergen, Norway.

Frederic Charles Bartlett, director, Psychological Laboratory of Cambridge, England

Science News Letter, May 10, 1947

ACADEMY MEETING—Among the scientists attending the annual meeting of the National Academy of Sciences were (front left to right): Drs. J. H. Hildebrand, University of California; J. C. Slater, Massachusetts Institute of Technology; E. U. Condon, director of the National Bureau of Standards; L. A. DuBridge, president of the California Institute of Technology; Albert W. Hull, General Electric Co.; and Vannevar Bush, president of the Carnegie Institution of Washington.

PHYSICS

Pistol for Doctors Gives Shot in Arm

➤ IF YOU SEE a doctor coming at you, brandishing what seems to be a pistol, don't be scared. All you're going to get is a shot in the arm.

A "vaccinating gun", with pistol grip, trigger and barrel, is an interesting recently patented invention. It is covered by U. S. patent 2,417,140, granted to Francis J. Swanson, of Saratoga, Wyo.

The barrel of the pistol is simply a large hypodermic syringe, graduated for doses in cubic centimeters. The weapon is cocked by pulling back the plunger, which has a rack on its under side. This is engaged by a spring pawl mounted on a rod connected with the trigger. Pressing on the trigger shoves the plunger home by a predetermined number of notches, causing a measured dose of the vaccine or serum to flow through the needle into the patient's arm.

Science News Letter, May 10, 1947

GEOPHYSICS

Water Erosion of Soil Can Be Reduced to Formulae

➤ WHEN WATER from a heavy rainstorm washes topsoil off a farmer's field, the process looks just about as chaotic and anarchic as can well be imagined; yet it is possible to express this destruction of basic wealth in terms of engineering formulae. At the meeting in Washington of the American Geophysical Union, W. D. Ellison of the U. S. Soil Conservation Service told how erosion is being made more understandable in order that it may be brought under control.

Water erosion involves two processes, detachment and transportation, he said. They are in a sense opposites: sand is easy to detach but hard to transport; clay is hard to detach but easy to transport. Loam, the most desirable type of tillable soil, is intermediate in both respects.

We commonly refer to water as a major agent of erosion, yet clean flowing water has little erosive power, Mr. Ellison stated. It is when it contains a certain amount of solid matter that water becomes able to tear loose bits of soil. Yet when water is loaded with all the solids it can possibly carry it is again relatively innocuous.

The one state in which pure water is able to initiate erosion is falling raindrops, which toss up soil particles as they splash. It is possible to measure even this kind of damage and reduce it to terms of engineering formulae, the speaker declared.

Science News Letter, May 10, 1947

BIOLOGY

Dr. Harrison Receives John J. Carty Award

➤ DR. ROSS G. HARRISON, professor emeritus of the Osborn Zoological Laboratory, Yale University, was awarded the John J. Carty gold medal and award of the National Academy of Sciences.

The award was made for outstanding contributions to science as an investigator, teacher and leader. Dr. Harrison discovered that tissue cells may grow outside the animal body and thus demonstrated the manner of growth of nerve fibers. He headed the National Research Council during World War II.

Science News Letter, May 10, 1947

TELEPHOTO LENS—With this 125-pound lens, the Army Air Forces will be able to snap large, sharp pictures from altitudes as high as 10 miles. The lens, compared in the picture to a lens like in a 16-mm. movie camera, is a foot in diameter and four feet long.

GENETICS

Cancer Cells Are Strangers

Mutations, evolutionary changes, may cause cancer cells to become strangers to the body. This may account for cancer cells' disobedience to discipline.

➤ A CANCER may not be, as commonly explained, a mass of the patient's own cells gone wild and growing anarchically. The diseased cells, although originally flesh of his flesh, may have in a dreadful sense become strangers to the body in which they dwell, through one of those sudden, leaping evolutionary changes known as mutations. Had such a change occurred in one of the reproductive cells, the resulting child (if it lived) would be a freak of some kind, unrecognizable as the offspring of its parent.

This lack of real genetic kinship between the patient's normal body-cells and the cells of his cancer may account, among other things, for the refusal of the cancer to obey the commands of the growth-regulating chemicals, or hormones, that keep the normal parts of the body properly disciplined.

Striking new evidence bearing on this theory was presented before the meeting. of the National Academy of Sciences in Washington by Dr. M. Demerec, head of the genetics department of the Carnegie Institution of Washington. Dr. Demerec has succeeded in producing mutations in fruitflies, classic experimental material of geneticists, by exposing parent insects to atmospheres in which continuous aerosol mists of cancer-causing chemical solutions were maintained.

He had his first success with a war-gas that never saw action, one of the nitrogen mustards. When he found that this would produce both mutations and chromosomal rearrangments, he tried other cancer-causing chemicals, and found that he could produce mutations with four of them: dibenzanthracene, methylcholanthrene, benzpyrene and beta-naphthylamine. He tried 19 other chemicals that do not cause cancer in laboratory mice, and none of them produced mutations in his fruitflies. He regards the fact that mutations arise in response to treatment with cancer-causing chemicals, and to them only, as highly significant in its bearing on the mutation theory of cancer origin.

Science News Letter, May 10, 1947

GEOPHYSICS

Young Volcano Generates Electricity When It Erupts

➤ A YOUNG volcano can be a very active generator of electricity when it is in eruption, if the newest of all volcanoes, Mexico's Paricutin, can be taken as a fair sample. O. H. Gish of the Carnegie Institution of Washington reported before the meeting of the American Geophysical Union on observations on the electrical conditions in Paricutin's eruption clouds.

The electrical charge in the cloud increases as the eruption activity grows, but its nature seems to depend on what is coming out. Clouds of steam and fumes have negative charges, ash clouds carry positive charges. Lightning-like discharges occurred only during heavy ash eruptions, and were of two sorts: long flashes, of about 1000 feet, and very short ones only about 10 feet long. This volcanic "lightning" does not contain as high energy charges as the real lightning flashes that occur during thunderstorms.

Science News Letter, May 10, 1947

MEDICINE

New Drug for Epilepsy Helps Where Others Fail

➤ MESANTOIN, a new drug in the treatment of epilepsy, is proving helpful where other drugs fail and may be superior, according to evidence presented at the meeting of the California Medical Association.

Dilantin, a cousin of mesantoin, has been considered the most useful drug in epilepsy in the past few years. However, it is relatively toxic, which prevents its use in many patients; further, many patients fail to respond to it.

Dr. Robert B. Aird, associate professor of surgery in the University of California Medical School, presented a study of 75 patients treated with mesantoin who had failed to respond to dilantin or for whom that drug has been toxic.

He said mesantoin was particularly effective in controlling seizures of the violent type. Eighty per cent of grand mal seizures, 79% of Jacksonian seizures, and 79% of psychomotor seizures were benefited. Of those benefited, more than half were greatly improved, while the remainder were only moderately helped.

The physician said it was particularly significant that only 9% of those given mesantoin had toxic reactions. Forty-seven per cent of the group had experienced toxic effects to dilantin.

He indicated that even more striking effects may be achieved in treating the general run of epilepsy patients where there has been no selection on the basis of toxicity to dilantin.

Dr. Aird warned that while mesantoin is relatively low on toxicity, it must be used with care since it is capable of producing alarming toxic effects.

Science News Letter, May 10, 1947

MEDICINE

Artificial Kidney Removes Poisons from Bloodstream

➤ EIGHT PERSONS doomed to almost certain death from kidney failure have been saved by an artificial kidney developed by a Dutch doctor during the war.

First detailed account of the artificial kidney was given to American doctors by its inventor, Dr. W. J. Kolff, at a meeting at Mount Sinai Hospital, in New York. Dr. Kolff is chief of the department of medicine at the Municipal Hospital at Kampen, Holland.

In this tiny Dutch town Dr. Kolff worked in secrecy during the Nazi occupation, often having to hide his apparatus so the Germans would not take it away from him.

The artificial kidney consists of a drum on which is wound a cellophane tube. The entire affair, drum and 50 yards of tube, is immersed in a bath containing a salt solution. The radial artery in the forearm of the patient is connected with the tube and the blood flows through it and diffuses out into the salt solution. There the poisonous substances from the kidney which are threatening to kill the patient are removed. The blood is then returned from the cellophane tube into a vein in the patient's body.

The artificial kidney is used for conditions in which the kidney does not work but in which there is hope that it might recover its ability to function in a few days if the patient could be kept alive that long. Cases of poisoning with bichloride of mercury, toxic reactions to sulfa drugs, reactions after blood transfusions and occasional kidney poisoning after operations are the type in which the artificial kidney would be used.

Irrigation of the peritoneal cavity in the abdomen has been tried in this country for the same purpose.

Science News Letter, May 10, 1947

IN SCIEN

PHYSICS

Click Is Not Music Because It Has No Tone

➤ IS A CLICK music? The answer is no, Drs. J. M. Doughty and W. R. Garner of Johns Hopkins University told the Eastern Psychological Association meeting in Atlantic City, N. J. A click has no tone.

A click is short, a tone is longer.

With a click you can't tell whether the sound is low or high in pitch. If the sound is just a little longer, it still sounds like a click, but you have an idea as to whether it is a high click or a low click.

If it lasts longer, you hear the pitch. Then the sound is definitely a tone.

Science News Letter, May 10, 1947

PHYSICS

Swedish Telephone Has Dial In Flat Base of Handset

➤ A HANDSET telephone instrument that doesn't need any cradle is the newest thing in compact means of communication; it is covered by U. S. patent 2,419,388, issued to two Swedish inventors, Knut H. Blomberg of Appelviken and Ralph A. G. Lysell of Midsommarkransen.

The dial and necessary signalling apparatus are in the lower part of the instrument; when not in use it stands on the dial. A projecting button in the middle of the dial, pressed in by the instrument's weight, keeps the speech circuit open.

To use, the instrument is either picked up in the left hand or tilted over on the square rear edge of its base while the number is dialed. The receiver is at the top of the instrument's upward-sloping column; the transmitting microphone is concealed within the front side of the base, behind a slotted grill. At the close of the conversation you "hang up" by merely setting the telephone down.

Rights in the patent are assigned to the Swedish firm, Telefonaktiebolaget L. M. Ericsson of Stockholm.

Science News Letter, May 10, 1947

E FIELDS

FOOD TECHNOLOGY

Radiant Heat, Hot Gases Used in Food Dehydration

➤ VEGETABLES can be dehydrated more rapidly and keep their appearance and flavor better if treated with a combination of radiant heat from electric elements and a current of very dry, very hot air or other gas at the same time, claims Clarence Birdseye of Gloucester, Mass., pioneer of the frozen-foods industry who is now entering other fields of food processing. Three new U. S. patents, 2,419,875 to 2,419,877, have been issued to him on this combination, which also includes the use of high-frequency electromagnetic waves.

Two things are necessary during the process, Mr. Birdseye points out: the vegetable slices or dice must be of fairly small dimensions, and they must be kept constantly agitated as they are carried through the dehydrating cabinet on a series of conveyor belts.

Dehydration and quick-freezing are combined in the third patent; it has been found advantageous to remove part of the water from some fruits before freezing them in syrup.

Science News Letter, May 10, 1947

MEDICINE

Streptomycin Treatment Cures Rabbit Fever

➤ STREPTOMYCIN can save life even before the doctor knows precisely what ails the patient. And it can practically wipe out deaths from rabbit fever pneumonia if given early.

These striking facts about the famous remedy extracted from microbes living in the soil were presented to members of the American College of Physicians meeting in Chicago by Dr. Hugh J. Morgan of Vanderbilt University Hospital, who took office recently as president of the college.

The pneumonia that may come with rabbit fever, or tularemia, used to kill between 20 and 40 of every 100 patients. In a group of 27 patients treated with streptomycin, only one died, Dr. Morgan reported. That death was not due to the tularemic pneumonia but to another condition.

One symptom of tularemia is an ulcer at the spot where the germs got into the body. Enlarged lymph nodes, called "kernels", are other signs of the disease.

In more than half the patients with tularemic pneumonia, however, there may not be any ulcers or "kernels." In that case the doctor could not be sure what disease he was treating until he had the results of laboratory tests. These tests take about two or three weeks. In some cases the patient may be dead days before the tests show that he had tularemia.

Streptomycin is a cure for tularemia with or without the highly fatal pneumonia that may accompany it. But to save the patient with tularemic pneumonia, it must be given early.

Dr. Morgan warned fellow physicians that patients critically ill with pneumonia of undetermined cause, if they are in a region where tularemia occurs, should be given streptomycin at once, without waiting for results of tests.

Science News Letter, May 10, 1947

GENERAL SCIENCE

Disastrous Errors May Stop U. S. Scientific Advances

➤ AMERICA may make disastrous errors in its scientific future similar to those that prevented the Germans from developing the atomic bomb, Dr. S. A. Goudsmit, Northwestern University physicist, warned the American Physical Society.

America's advance in science may be stopped by:

1. Complacency. 2. Lack of interest in "long-haired" science among our youth. 3. Political influence in administrative control of science.

These dangers that Dr. Goudsmit believes may have a fatal effect on our scientific progress correspond to these failings in Nazi Germany:

1. Extreme conceit of German scientists that made them certain their work was ahead of ours. 2. Clash between Nazi dogmas and science that reduced the number of students interested in pure science and drove many capable scientists into exile. 3. Administrators of science who got their jobs because of party connections and did not have confidence in the scientists.

Another reason for break-down of German research was hero worship of individual scientists and lack of team play through free clash of scientific opinion.

Science News Letter, May 10, 1947

GENETICS

Podophyllin Can Replace Colchicine at Less Cost

➤ COLCHICINE, the old-fashioned gout medicine that became a potent chemical to work radical evolutionary changes for plant breeders, now has a rival in podophyllin, an old-fashioned liver medicine. Podophyllin, which is a resin extracted from the rootstocks of the may-apple plant, can do the same things that colchicine does, and costs only a small fraction as much.

A lot more needs to be learned about podophyllin, report Drs. B. J. Sullivan and H. L. Wechsler, Fordham University biologists, in *Science* (April 25). Its single name implies that it is a single substance, whereas it contains at least four distinct organic compounds, and it is not known which of the four has the colchicine-like effect of stopping cell division half-way and thereby producing giant varieties of plants. This is what the two Fordham biologists are undertaking to do.

First to notice the effect of podophyllin on cell division were two men who were at the time in the medical service of the Army, Maj. Lester S. King and Maj. Maurice Sullivan. Podophyllin, though no longer on the approved list as an internal medicine, is useful in one type of skin ailment, and it was their observation on what it did in clinical use that led them to a more careful examination of its effects on the division process in animal cells.

Science News Letter, May 10, 1947

CHEMISTRY

Suburban Atoms Determine What Happens in Molecule

➤ IF CHEMICAL molecules are thought of as cities, it is the suburban atoms in them that determine what happens. This in essence is what Dr. J. H. Hildebrand of the University of California reported to the National Academy of Sciences after experiments on liquids whose molecules vary greatly in size. The atoms on the outside of the molecules are the main centers of attraction in the molecular world, and the buried atoms contribute but little. Molecules, the smallest combinations of atoms, are practically all too small to be seen with even the most powerful microscopes. They determine the properties of matter, however.

Science News Letter, May 10, 1947

CHEMISTRY

Aluminum from Common Clay

U. S. chemical process of getting light metal from clay beneath our feet was "impossible" to Germans. Hydrochloric acid is reagent used.

See Front Cover

By HELEN M. DAVIS

➤ THEY SAID it was impossible because it required too much energy. In addition, the Germans had tried it and failed. That clinched it. Nobody could extract aluminum from clay.

Everybody knew that untold quantities of the light, tough metal lie at our feet, locked up in that commonest of minerals, hydrated aluminum silicate—common clay. Most chemists, following the dictum of some old-timers, were content to resign themselves to the idea that there it would remain forever.

Not so Dr. James I. Hoffman of the National Bureau of Standards. When ships loaded with bauxite, the sole practical ore of aluminum, were regularly setting out from foreign ports during the war, only to end their voyages in the depths of the sea, the War Department called upon the government scientist to "do something."

Dr. Hoffman, trained as an analytical chemist, is accustomed to pursuing elusive metals through cycles of alternate solution and precipitation. He knows how aluminum salts behave in test tubes. "Why not," he asked, "use these laboratory methods on a pilot-plant scale and take out the aluminum in a form in which we can feed it into the commercial reduction process and get the metal?"

"Couldn't Be Done"

There were plenty of experts who dogged Dr. Hoffman's footsteps whining that it could not be done, but with the help of a small but devoted crew of fellowworkers a pilot plant was rigged up. They built it in an abandoned garage, which was once a stable. Their three-story Herreshoff furnace where, as the final stage in the process, the precipitated chloride is ignited to change it into the oxide, alumina, rises from the floor of the one-time stalls to the gable-peak of the hayloft.

The group assembled rather than built the equipment. A replaced and obsolescent boiler from the Bureau's power plant was a lucky find. Bit by bit, under the skillful hands of Herbert Lowey, their instrument maker, the plant took shape. With Dr. Hoffman worked Dr. Robert T. Leslie, George Derbyshire, Willard Hubbard, Wilmer A. Hemminger and Lewis J. Clark, aided also by Dr. Hoffman's son, John Drake Hoffman, who has now returned to finish his graduate work at Princeton. During part of the time H. J. Caul, on loan from the American Dental Association, also worked with the group.

Any Clay Can Be Used

For raw material these scientists can use almost any kind of clay, but the kind they are working on at present is rejected as too coarse by the factories that make fine china dishes. It is white to pale yellow in color, the yellowish tints betraying the presence of iron. Such clay is shown on the cover of this SCIENCE NEWS LETTER.

Iron was a stumbling block to one of the suggested methods for solving the aluminum from clay problem. In that method the materials not wanted were removed, and it would take a lot of removing to get rid of all the iron in the red clays of our southern seaboard states.

While Dr. Hoffman prefers the white clay to the red for his pilot plant, the presence of iron does not trouble him. In his process the aluminum compound, which he does want, is taken out of solution, and the rest of the material runs off in the liquid squeezed out of the filter.

The reason chemists for over a century have been saying that aluminum from clay is an impossibility is the fact that the light metal is there found combined with silicon and oxygen in a form which requires energy to break up. The amount of energy required was believed to be so great that it would never be possible to sell the finished metal for enough money to pay for its manufacture.

Several other processes for obtaining the light metal from sources other than bauxite have been tried out on an experimental scale. Three of them use sulfuric acid or a sulfate mineral, whereas Dr. Hoffman's is the only process using all hydrochloric acid. The other type method employs the chemically opposite alkaline reaction, known in general as the Bayer process.

Variants of this alkaline process use lime or lime-soda, with which the clay is roasted until it glows, or sinters. Water-soluble aluminum salts are then leached out by washing. Such processes have been worked out by Dr. Connolly and associates at the U. S. Bureau of Mines, by Dr. Wells at the Bureau of Standards, by Monolith Portland Cement Co. in Wyoming, by the Ancor Corporation at St. George, S. C., and probably by Alcoa.

Economically, these processes depend upon the lucky occurrence of lime and clay of the proper quality in neighboring locations. The Anaconda Copper Co. put a process through the pilot plant stage in which they started with hydrochloric acid but ended with the Bayer method.

Sulfuric Acid Processes

Of the sulfuric acid processes, one was worked out by TVA at Wilson Dam. Ala. A modification of this method, known as the Kalunite process, has been worked out for getting aluminum from the sulfate mineral, alunite. A third kind of similar process using ammonium sulfate was developed by the Chemical Construction Co. in the Pacific Northwest.

Naturally, the men who worked out these processes are each proud of success in doing what "could not be done." None of these experimental processes can at present compete economically with the standard bauxite method. But "the availability of all the foregoing processes," according to Dr. Hoffman, "affords good insurance for an abundant supply of aluminum in the United States in the future."

The all-hydrochloric acid process which Dr. Hoffman has demonstrated has the advantage of producing pure alumina, ready for electrolytic reduction. It gets rid, in its first step, of the silica half of the clay. This is the step long believed theoretically impossible. Many metallurgists had resigned themselves to the idea that silica-free alumina from clay could never be a paying proposition.

But Dr. Hoffman and his associates have found conditions otherwise in their process. They first heat the clay to about 1300 degrees Fahrenheit which, as industrial processes go, is a rather mild temperature. This is not hot enough to bake the clay into refractory brick, but it furnishes enough energy to break the connection between the aluminum and the silicon in the molecule. The silicon then comes out as so much inert white sand, or silica, which takes no further part in the chemical process.

Dissolved in Acid

After the first roasting, the clay is dissolved in a solution of hydrochloric acid and filtered off from the silica. From this point the object is to get out of the solution only a compound of the aluminum, which is desired, and to leave everything else in solution.

It is here that Dr. Hoffman's special knowledge of the behavior of aluminum compounds stood him in good stead. He knew that if more hydrochloric acid, in the form of a gas, is led into a concentrated solution such as he gets by boiling down the liquid that comes from his filter, the aluminum and nothing else in it will turn into a fine white powder and collect at the bottom of his tank. And as a special bonus, the chemical action gives out heat, which helps on the fuel bill.

Here again, the wiseacres said "It can't be done. The crystals that fall through the liquid trickling down your precipitation column while the acid gas bubbles up through it, will cut your pumps to pieces."

But Dr. Hoffman knew he had a fantastic corrosion problem to face when he started out. He presumed that it was the impossibility of preventing hydrochloric acid from eating away their metal tanks that had made the Germans give up the process years before. But with modern materials available, Dr. Hoffman built his plant with plastics and glass in place of metal, and defied the abrasion of the crystals and the acid vapors. Besides, he can watch the liquids circulating through the glass pipe sections and see how the process is coming on.

The vapors take their revenge on the scientists by destroying their clothes. Anything made of cotton soon falls into shreds in this experimental plant, so that even the window cords have either to be replaced by gaudy-colored decorators' cords of synthetic material or abandoned in favor of old-fashioned props.

IN SOLUTION—Silica and other insoluble matter are removed from the aluminum by a filter press.

Coming to work, the scientists hang their street clothes on glamorous plastic hangers, designed for evening gowns but impervious to acid. They shut the garments away behind heavy wooden doors, and put on tattered old clothes which can stand the gaff.

Dressed like beggars, these keen-eyed men figure on economies that will run into millions of dollars when their process is put into full commercial operation even though, as a government development, their pioneer work is available to any manufacturer with the foresight to take advantage of it.

The cost problems now being studied are the usual ones of chemical production: economical use of power and recovery of usable materials from waste. At present the price of metal from nearby clay by the Hoffman process is about twice that from bauxite brought in from abroad.

Many factors may operate to change that cost ratio in the future. What the Bureau of Standards scientists have done is to work out in practical terms the answer to an old laboratory problem. They have proved that commercial extraction of aluminum can be done.

Now these chemists are going on to details of economical operation of the plant, and by-product recovery. They are confining and re-using the acid vapors. They point out that many of the elements that occur in the clay are all in solution in the filter water, if anyone can use them. Iron is there, certainly, although it would not pay to take it out. Other valuable materials, such as potash, may be present in some clays.

It might pay to recover some of them, although, says Dr. Hoffman, "this is hardly likely to be the case in the first 190 billion tons of clay that we will use." One hundred ninety billion tons of clay will yield nearly 38 billion tons of aluminum metal by the Hoffman process. Aluminum, being one of the lightest as well as most abundant metals, gives us more sheet metal to the ton than any other common structural material.

Science News Letter, May 10, 1947

CHEMISTRY

Steam Recovers Fluoride

➤ HYDROGEN FLUORIDE used as a catalyst in oil refining is recovered from the spent condition by treatment with superheated steam, in the process on which James D. Gibson of Bartlesville, Okla., has received patent 2,419,558, which is assigned to the Phillips Petroleum Company. The fluorine comes out as hydrofluoric acid, which may be concentrated to the anhydrous condition.

Science News Letter, May 10, 1947

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MEDICINE

Dr. S. A. Waksman to Get Passano Foundation Award

➤ DR. SELMAN A. WAKSMAN, microbiologist at the New Jersey Agricultural Experiment Station and discoverer of streptomycin and other antibiotics, will receive the $5,000 Passano Foundation award.

Dr. Waksman will receive the award at a dinner June 12, during the centennial meeting of the American Medical Association at Atlantic City. The Passano Foundation, which is making the award, was established in 1943 by the Williams and Wilkins Company, medical publishers in Baltimore.

Science News Letter, May 10, 1947

MEDICINE

Moths, Mice Are Bred To Aid Human Health

➤ RED-EYED meal moths and kinky-tailed mice are being bred in a Wesleyan University laboratory as aids to better health for humans.

The kinky-tailed mice with some distant cousins that have forked tails or no tails at all will, it is hoped, lead to methods for eliminating deformed spines in new-born babies.

X-raying the expectant mother mouse at a certain period of pregnancy will cause her offspring to be born with tail deformities, Dr. Ernest W. Caspari of Wesleyan has discovered. Mouse tails, he explains, are nothing but elongations of the spinal column and therefore provide a good tool for studying hereditary defects of the spine.

Dietary improvements may be the contribution to health made by the red-eyed meal moths in Dr. Caspari's laboratory.

Meal moths are meal mill pests and ordinarily have dark brown eyes. The red-eyed strain is extremely rare and the deformity is apparently caused by a lack of hormones. The larvae of one of the strain spin silk when kept out of the light and under carefully regulated temperatures. Perhaps due to the extraction during the milling process of some chemical necessary for the proper balance, Dr. Caspari has found it impossible to create the spinning condition by feeding the moths home-ground meal, but can do so with commercially ground meal.

Science News Letter, May 10, 1947

Do You Know?

Stones of the familiar *apricot* are used in the cosmetics industry.

Flower *seeds* do best in a loose soil containing humus that will not pack.

Industrial *dusts* of many kinds, from flour to metal powders, are explosive as well as coal dust in mines.

The *hippopotamus*, which may weigh four tons or over, has a hide almost two inches thick which sometimes weighs a quarter of a ton.

The cycle from eggs to larvae to adult *houseflies* requires 12 to 14 days.

Dried green *bananas* are sometimes ground into flour which, mixed with wheat flour, makes an excellent bread.

Silicon carbide, or *carborundum*, made in electric furnaces from sand and carbon, is a promising ceramic for use in the high temperatures at which gas-turbine blades must work.

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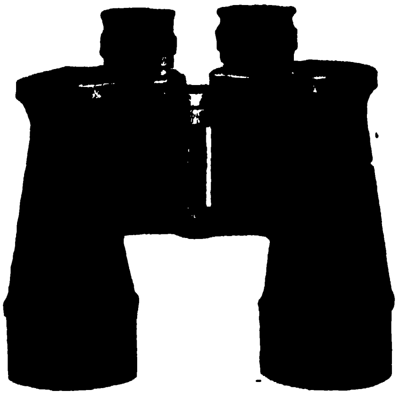

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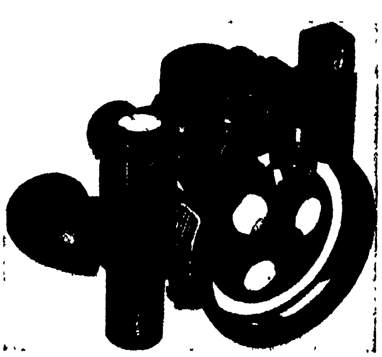

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ECOLOGY

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by Frank Thone

Useful Citizens

➤ MUSHROOMS, puffballs, bracket-fungi, even the repulsive stinkhorns, as well as the host of lesser, mold-like fungi that as a rule we never notice at all, are among the most useful citizens of the outdoor world. We commit an injustice when we half-resent their elfin intrusion into the dainty society of spring wildflowers. If it were not for the fungi and myriads of humble beings like them there might not be any wildflowers—or for that matter any towering forest trees.

The gay, bright assembly of wildflowers depends on the silent, mostly unregarded ministrations of the fungi and other decay-organisms as the gay, bright upper strata of human society depends on scullions and street-sweepers, garbagemen and gravediggers. Without a corps of workers, however uncouth, to dispose of wastes and to bury the dead, there could be no gracious living, whether by columbines or countesses.

The organisms of decay, of which mushrooms and other fleshy fungi are only the most noticeable examples, are many and varied. They run the whole gamut of fungi and bacteria, and that strange half-world between the two, the actinomycetes, about which nobody but botanists ever heard until one of them turned in that all-but-universal remedy, streptomycin. On the animal side there are insects of all kinds, but especially beetles, termites and ants; strange little nameless mites that are half-cousins of insects; worms of all sizes and degrees; microscopic one-celled creatures called protozoa. At the very bottom of this scavengers' social scale are the slime-molds, that look, in mass, like splashes of wet paint, and that are individually in some ways like plants, in other ways like lowly animals.

This motley and complex array devours last year's fallen leaves, dead logs and stumps, the petals of flowers as they wither and fall, the dead bird that a weasel has slain, the weasel himself when death at last overtakes him. All body wastes, all waste bodies—these are their assignments.

Like all good morticians and waste-disposal squads, they do their work quietly and unobtrusively. They operate mostly from undersides and insides; usually they shun the light, and therefore they can carry on by night as well as by day. Only occasionally do they advertise their presence by such manifestations as mushrooms or Indian-pipe flowers. And before you fairly realize it, what were fallen leaves and dead sticks have lost their shapes and identities and have become soil-enriching humus.

And on this dark fare, prepared in silence and secrecy, our loveliest and most delicate spring flowers thrive.

Science News Letter, May 10, 1947

METEOROLOGY

Most Cold Waves Come When Sun Is Spottiest

➤ COLD WAVES sweep down out of the North most often during the winters when there are most spots on the sun, Irving I. Schell, consulting meteorologist of Boston, stated before the meeting of the American Geophysical Union. He made a statistical study of 15 winters, six of which were in the years of great increase of sunspot numbers and nine in low sunspot years. There were 71 cases of high-pressure areas originating in the northwest quarter of North America and bringing cold waves during the six "spotty" years, as compared with only 21 cases during the nine winters when the sun had few spots.

Science News Letter, May 10, 1947

CHEMISTRY

Copper and Nickel Alloy Makes Fluorine Container

➤ MEDIEVAL alchemists seeking for the "universal solvent" were stumped by the question: "But what will you keep it in if you find it?" Nearest modern relative of this mythical fluid is the gas fluorine, related to chlorine but far more corrosive, which has recently been found exceedingly useful in industry.

The container problem was solved by two Bronxville, N. Y., chemists, Homer F. Priest and Aristid V. Grosse, who found that in cylinders of copper, nickel, or an alloy of both, the fluorine quickly forms a coating of a compound which protects the rest of the metal from further attacks. All valves and other fittings have to be made of the same metal.

The patent, No. 2,419,915, has been assigned to the U. S. government through the Office of Scientific Research and Development.

Science News Letter, May 10, 1947

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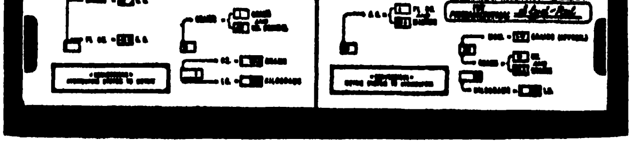

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AMERICAN WILD FLOWERS—Ethel Hinckley Hausman—*Garden City*, 534 p., illus., $2.49. Careful cross-indexing enables the reader to find flowers under any one of the common names, while the guide to flower families aids in identification of unknown specimens.

ANNUAL REPORT OF THE DIRECTOR OF THE MINT FOR THE FISCAL YEAR ENDED JUNE 30, 1946, INCLUDING REPORT ON THE PRODUCTION OF PRECIOUS METALS —*Govt. Printing Office*, 96 p., paper, 30 cents.

ASTRONOMY FOR BUSY PEOPLE — A. L Bedell—*publ. by the author*, 31 p, illus., paper, 75 cents. An accumulation of frequently used data, together with the author's 13 star maps and circular sky map.

BUTALASTIC POLYMERS; Their Preparation and Applications, A Treatise on Synthetic Rubbers — Frederick Marchionna—*Reinhold*, 642 p., $8.50. A technical book with references at the end of each chapter and the complete listing of U. S. patents on this subject.

THE COMPLETE HOME DECORATOR—Catherine Klock — *Cadillac*, 334 p., illus., $2.95. Complete with color harmonizing guide and room plotter with reproductions of tiny pieces of furniture, this decorating book should make it pleasant and easy to have a lovely home.

EXPERIENCES WITH FOLIC ACID—Tom D. Spies—*Year Bk. Pubs.*, 109 p., illus., $3.75 A survey of the field of folic acid therapy in the treatment of macrocytic anemia useful to the physician, biochemist, biologist and nutritionist.

FLOWER ARRANGEMENT FOR EVERYONE— Dorothy Biddle and Dorothea Blom — *Barrows*, 192 p., illus., $2.50. The simple text makes it easy for all to enjoy this outlet for creative ability.

GUIDE TO HEALTH ORGANIZATION IN THE UNITED STATES—Joseph W. Mountin and Evelyn Flook—*U. S. Pub. Health Service*, Misc. Publ. No. 35, 71 p., paper, 20 cents. An overall survey of the many agencies and facilities which render health services in our nation.

THE INFLUENCE OF ISLAM ON A SUDANESE RELIGION — Joseph Greenberg—*Augustin*, Monograph of the American Ethnological Society, No. 10, 72 p., $2.50. The region chosen was one in which Moslem influences had been at work long enough for their effects to be judged. It had also a pagan rural population which remained uninfluenced and authentic historical records.

INJECTION MOLDING OF PLASTICS—Islyn Thomas—*Reinhold*, 534 p., illus., $10. A specific and detailed coverage of the field of injection molding. Up-to-date methods are carefully described and meticulously illustrated with over 500 detailed plates showing each phase of the operations.

AN INTRODUCTION TO ENGINEERING PLASTICS—D. Warburton Brown and Wilbur T. Harris—*Murray Hill Bks.*, 276 p., illus., $4. Written to help engineers and industrial designers make the best choice and use of plastics for their purposes, this book also contains plant and equipment data, design and commercial tolerances, trade names of the plastics, their applications and manufacturers, and recommended tolerances for phenolic and urea moldings.

THE MAMMALS OF MICHIGAN — William H Burt—*Univ. of Mich. Press*, 288 p, illus., $3.50. This first authentic book on the wild mammals of Michigan in historic times contains a simple illustrated recognition key for identification either from animal or skull. Maps show the distribution of sixty-seven species in the state and in North America, and tables give size, life span, etc. and dental formulae.

MASTERWORKS OF SCIENCE—John Warren Knedler, Jr, ed.—*Doubleday*, 637 p., $4 Digests of thirteen classics, authors represented are Euclid, Archimedes, Copernicus, Galileo, Newton, Dalton, Lyell, Darwin, Faraday, Mendel, Mendeleyev, Curie, and Einstein

MODELING FOR MOTHERHOOD—Doris Hale Heinz and Katherine Smith Bolt—*Wiley*, 74 p., illus, $2. How to keep up your posture and your morale and have fun waiting for the baby.

A NEW NOTATION AND ENUMERATION SYSTEM FOR ORGANIC COMPOUNDS—G Malcolm Dyson—*Longmans*, 63 p, $1.75 This new notation is placed before chemists in the hope that it may solve the difficulties of increasingly difficult chemical nomenclature, to test it, five volumes of Beilstein have been ciphered and indexed successfully.

PREHISTORY AND THE MISSOURI VALLEY DEVELOPMENT PROGRAM: SUMMARY REPORT ON THE MISSOURI RIVER BASIN ARCHEOLOGICAL SURVEY IN 1946—Waldo R. Wedel—*Smithsonian*, Misc. Pubs. Vol. 107 No. 6, 17 p., paper, 15 cents A statement of the necessary archeological program to salvage information of the important sites here located before they are obliterated by the flood control program.

THE PROBLEM OF REDUCING VULNERABILITY TO ATOMIC BOMBS—Ansley J. Coale—*Princeton Univ. Press*, 116 p., $2. Prepared under the direction of the Committee on Social and Economic Aspects of Atomic Energy of the Social Science Research Council, this treatise recommends the reduction of vulnerability to all nations, feeling that considerations of the problem may lead to stable agreement.

REHABILITATION THROUGH BETTER NUTRITION—Tom D. Spies—*Saunders*, 94 p, illus., $4. Monograph for the physician to aid him in achieving the goal of full rehabilitation of patients with nutritive failure.

THE ROCKEFELLER FOUNDATION: A REVIEW FOR 1946—Raymond B. Fosdick—*Rockefeller Foundation*, 64 p., paper, free. An analysis of the year's work of this organization by its president, in which he emphasizes the need for more trained personnel in medical sciences, more study of the humanistic sciences and thorough investigations in the field of human relations

THE RUBBER INDUSTRY—Josephine Perry—*Longmans*, rev. ed, 127 p., illus., $2. Including both natural and synthetic rubbers, this description of their processing and preparation will materially aid in understatnding the complexities of this vast industry.

SEARCH FOR GLORY—Kevin Guinagh — *Longmans*, 220 p., $2.50. A biography of Pilatre de Rozier who was, in turn, pharmacist, tent-maker, research scientist, and courtier. He finally achieved the fame he sought by being the first man to fly in the Montgolfier brothers' hot-air balloon.

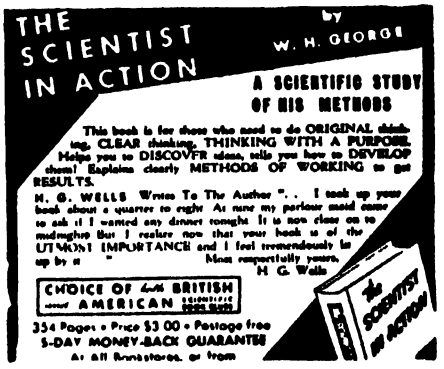
A TEXTBOOK OF SYSTEMATIC BOTANY— Deane B. Swingle—*McGraw-Hill*, 3rd ed, 343 p., illus., $3.50 This revision of a well-known text contains a discussion of the newer species concept and the experimental method in taxonomy as well as meeting the demand for a textbook approaching the subject through genetics, ecology, cytology and geography.

TEXTILE FIBERS—J. Merritt Matthews, ed by Herbert R Mauersberger—*Wiley*, 5th ed, 1133 p., illus, $12.50. This excellent text has been brought up to date by the editor and a technical advisory review board. It is a practical reference to the entire textile industry and deals exhaustively with the physical, chemical and microscopical properties of both natural and synthetic fibers.

WOOD DISTILLATION—Northeastern Wood Utilization Council—*publ. by the Council*, 60 p, paper, $1 Four articles dealing with modernization of hardwood distillation, resumé of research in Quebec, recent developments in the production of charcoal and its by-products, and activated carbon as a wood product yield valuable technical data Statistics of production and export are included.

Science News Letter, May 10, 1947

The name *Pennsylvania* is still appropriate for that state because it is now approximately 53% woodland.



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❁ *AIR BULB, attached to an automobile fender, warns the driver when the fender is about to touch a curbing, wall or adjacent car. It is a squeeze bulb and the air pressure created by contact against an object works a simple electric switch, causing a warning signal.*

Science News Letter, May 10, 1947

❁ *HARDWOOD table tops, uninjured by hot plates, alcohol, coffee pots and lighted cigarettes, are made with a thin sheet of aluminum under the outside veneer of wood. Cold-bonding adhesives bind the two together and a new heat-resistant varnish protects the veneer.*

Science News Letter, May 10, 1947

❁ *CARDMASTER is a device for the card table which permits a player of gin rummy or other games to draw out one card only at a time. The cards, backs up, rest on a sloping face so arranged that one at a time can be drawn out under side pieces by the tips of the fingers. A drawer beneath provides storage space for a deck.*

Science News Letter, May 10, 1947

❁ *CLEANING attachment for phonograph records, recently patented, is fixed to the cabinet adjacent to the turntable, and carries a wiper arm and wiper over the record disk. The record rotates under the wiper blade, which extends radially on the disk.*

Science News Letter, May 10, 1947

❁ *ELECTRIC MIXER for home kitchens has a light plastic case easily grasped in one hand, as shown in the picture. Thumb pressure on a knob at the top operates the switch that turns the current on and off.*

Science News Letter, May 10, 1947

❁ *MINIATURE central heating system, for trailer coaches where 110-volt, 60-cycle, alternating current is available, burns automotive gasoline in a sealed stainless steel chamber. It is equipped with automatic electrical ignition, and by forced ventilation circulates fresh air drawn in from the outside.*

Science News Letter, May 10, 1947

❁ *PLAY RACK for baby is suspended across the crib in a swaying position where its contents can be reached by the youngster. Made of a tough, smooth plastic, it contains a yellow duck that tilts in various positions, a teething ring swinging from the center, and marbles that roll back and forward, or can be spun in their racks.*

Science News Letter, May 10, 1947

❁ *WALLBOARD, made from sawdust and shavings from lumber mills, may soon be available, manufactured by an inexpensive process developed by Polytechnic Institute of Brooklyn. The natural lignin in the wood, activated by a special chemical, is the bonding agent, the slabs being formed under heat and pressure.*

Science News Letter, May 10, 1947

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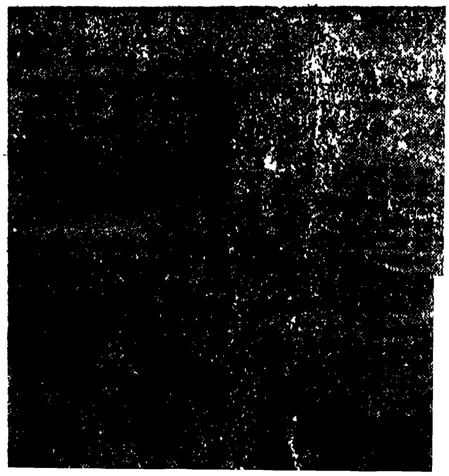

Question Box

CHEMISTRY

For what is heavy water used in atomic bomb projects? p. 292.

How is aluminum made from common clay? p. 298.

What are the advantages of the hydrochloric acid method of getting aluminum from clay. p. 298.

ECOLOGY

How are mold-like fungi good citizens? p. 302.

ENGINEERING

How is one big engine made from five little ones? p. 293.

GENERAL SCIENCE

Who was elected president of the National Academy of Sciences? p. 294.

GENETICS

How do cancer cells become strangers to the body? p. 295.

GEOPHYSICS

What two processes are involved in water erosion? p. 295.

MEDICINE

What in milk builds strong bones? p. 293.

What new drug helps epilepsy where others fail? p. 296.

What operation relieves [illegible] pain? p. 291.

PHYSICS

Is a click music? p. 296.

Pictures: *Science Service, cover, p. 294, 299; Westinghouse Corporation, p. 291; U. S. Navy, p. 293; Eastman Kodak Co., p. 295.*

Where published sources are used they are cited.

15

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

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21 JUL 1947

MEDICINE

Chemical Helps Hearing

Treatment with histamine may restore hearing to many overtaken by sudden deafness. Swelling of ear labyrinth causes condition.

➤ A NEW TREATMENT which restores hearing to victims of sudden deafness has been discovered by Drs. Olav E. Hallberg and Bayard T. Horton of the Mayo Clinic in Rochester.

"Many of the unfortunate persons" afflicted with this particular type of deafness will be helped by the new treatment, the doctors believe.

The treatment consists of daily injections into the veins of a chemical called histamine. This chemical has been used by Dr. Horton and associates to treat Meniere's disease, a condition featured by a special kind of dizziness, nausea, vomiting and sometimes deafness. In treating Meniere's disease the doctors were concentrating on relieving the incapacitating spells of dizziness, or vertigo. They noticed, however, that about half the patients got some improvement in hearing.

First use of the chemical primarily to relieve deafness was made two years ago. This was in the case of a 45-year-old man who came to the Mayo Clinic the day after he had suddenly gone completely deaf in his right ear. He had a buzzing, ringing sensation in his ear, but no nausea, vomiting or dizziness. He was given histamine injections daily for 12 days. On the seventh day, when there still had been no change in his hearing, the doctors were about to give up. They continued the treatment, however, and on the ninth day the man was able to hear with his previously deafened ear. After the twelfth treatment, his hearing was normal. An examination 18 months later showed he still could hear normally.

Spontaneous recovery of hearing in a case of this type had never before been seen by the Mayo Clinic doctors.

Three other patients were treated with histamine. Two were helped to recover some hearing but the third was not. The doctors believe this was because treatment was started too long after the damage to the nerve of the hearing. The sooner the treatment is begun, they say, the better the outlook.

The type of deafness in which the treatment is expected to help is one which occurs suddenly in older people. In most cases it is caused by hemorrhage into the labyrinth of the ear and is generally total and permanent. Doctors have called it "labyrinthine apoplexy."

A dropsy-like swelling of the ear's labyrinth, rather than bleeding into the labyrinth, is the cause of the condition, in the opinion of the Mayo doctors.

Science News Letter, May 17, 1947

GENERAL SCIENCE

American Engineer Awarded Watt International Medal

➤ DR. STEPHEN P. Timoshenko, professor emeritus of theoretical and applied mechanics at Stanford University, has been awarded the James Watt International Medal of the Council of the Institution of Mechanical Engineers of Great Britain.

The medal is awarded every two years to commemorate James Watt, pioneer in the development of the steam engine. The late Henry Ford was the only other American who received the medal.

Science News Letter, May 17, 1947

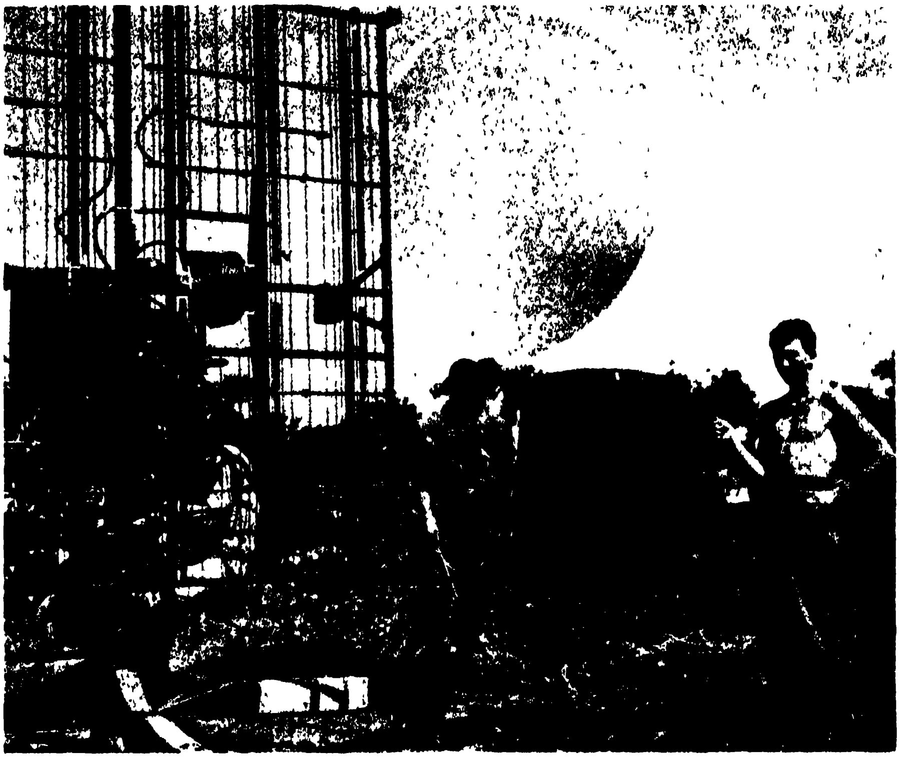
BACTERIOLOGY

New Antibiotic Attacks Seed-Dwelling Bacteria

➤ BACTERIA that lurk in the coat of seeds, and attack the young plants when they begin to sprout, can be successfully fought with an antibiotic compound secreted by the soil-dwelling germ known as *Bacillus subtilis*. This compound, which has been named subtilin, was used both on pure cultures of the seed-attacking bacterium and on seeds which had purposely been infected with it, by Dr. J. J. Goodman and Prof. A. W. Henry of the University of Alberta. In both series of experiments it prevented growth of the disease organism.

Details of the work of the two Canadian researchers are given in *Science* (March 21).

Science News Letter, May 17, 1947



WEATHER AND ECLIPSE—With the joint Army Air Forces-National Geographic expedition in Brazil, meteorologists are making a survey of that region of Brazil and observing the weather above the sun's eclipse. A radiosonde radio-equipped balloon is being installed.

Linlithgow Library.

MEDICINE

Blood Trapped in Shock

Radioactive iron and iodine have made possible a study of shock that has resulted in new knowledge of blood circulation. Isotope technique is best method of study.

➤ NEW KNOWLEDGE about the circulation of the blood and treatment of shock has been gained by the use of radioactive iron and iodine. Without the use of radioactive isotopes, such as are made in the atom bomb uranium pile, this new knowledge could not have been gained, Dr. John G. Gibson, 2nd, of Harvard Medical School, declared at a conference on isotopes in Nashville. The conference, held at Vanderbilt University in cooperation with the Clinton Laboratories and the Oak Ridge Institute of Nuclear Studies, is devoted chiefly to use of radioactive chemicals as tracers and in treatment of patients.

Treatment of shock should be devoted not only to restoring the total volume of blood in the body, Dr. Gibson's studies show. It should also be directed toward starting the blood flowing again in the tiny blood vessels called capillaries and keeping it circulating in these vessels.

In a state of shock, the amount of red blood cells and plasma circulating in the veins and arteries is always reduced below the amount that can be accounted for on the basis of the amount of blood lost through bleeding from a wound. Some of the unaccounted-for blood may be lost into the damaged part of the body, instead of out of the body, or by bleeding from the intestines in certain types of shock.

Regardless of cause, Dr. Gibson has found that in shock red blood cells get "trapped" in the tiny blood vessels in all the organs of the body. This trapping is widespread. As a result, the amount of blood flowing in capillary blood vessels through all the organs is reduced. The normal amount of blood in these capillaries is less than a fifth of the total volume of blood in the body. So the trapping of even a small part of it may fatally reduce the flow of blood through the capillaries.

Red blood cells tagged with two kinds of radioactive iron and blood serum albumin tagged with radioactive iodine were used in the studies. Before this radioactive isotope method became available, blood circulation was studied by the use of a blue dye and by measuring the mass of red cells that collect at the bottom of a glass tube when a sample of blood is whirled around in a centrifuge. Discrepancies between the results from these measurements in humans who had hemorrhages showed that the results obtained did not give a correct picture of the blood circulation. The isotope technique is free from the errors of the other methods.

Science News Letter, May 17, 1947

ACOUSTICS

Science-Music Institute

➤ LEOPOLD STOKOWSKI left his baton at home when he joined scientists in a technical discussion of science and music at the opening session of the Acoustical Society of America's meeting in New York.

The famous symphony conductor was one of several musicians who talked over the joint problems of the science of sounds with the scientists.

Speaking for the musicians, Dr. Howard Hanson, director of the Eastman School of Music, Rochester, N. Y., explained, "The musician of today often finds himself somewhat at the mercy of the sound engineer, the radio control operator, or the designer of electronic musical instruments.

"He is bewildered by the language of the cycle and decibel and by the complexity of the circuits, controls and equipment.

"The engineer on the other hand," Dr. Hanson pointed out, "is frequently unable to appreciate the point of view of the artists, whether through lack of training or by virtue of his temperament."

A three-way attack on the problem of getting the musicians and the scientists together was proposed by a committee of the Acoustical Society. The program would include common terminology for both science and music, setting up rules for measuring music and its effect on people and more get-togethers and greater exchange of information between the scientists and musicians.

Conductor Stokowski discussed a proposed institute of musical science. Dr. Harvey Fletcher of the Bell Telephone Laboratories, Murray Hill, N. J., suggested that the research program of the institute could range from the physics of producing sounds to the psychology of music appreciation of listeners.

Science News Letter, May 17, 1947

The white *pine* wood used in matches is cured for 12 to 18 months.

SCIENCE NEWS LETTER

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EINSTEIN TESTED—This 20-foot camera will be used in photographing the bending of starlight which passes near the sun during its eclipse May 20. Another photograph will be taken at night six months later from the same position. These pictures will help scientists check on the Einstein Theory of Relativity. Dr. George Van Biesbroeck of Yerkes Observatory, lower right, is in charge of the project.

ASTRONOMY

Prominences to Be Visible On Sun During Eclipse

➤ THERE ought to be some bright prominences, which are great red flames of glowing hydrogen and other gases, visible on both sides of the sun when the moon hides its disk. Astronomer U. S. Lyons, the solar expert of the Naval Observatory, said that there are two very active areas on the sun just now. One of them appeared on the eastern edge recently, and the solar rotation—which is about once in four weeks—will carry it to the western edge by the 20th. It is from such areas that prominences come. They cannot be seen when they are behind the sun, or on its face, but when they extend out past the edge they become visible at eclipse time. Also they can be viewed without an eclipse with a special instrument called the spectrohelioscope.

On May 20 another active area will just be at the eastern edge again, and that is why prominences are expected on both sides.

Science News Letter, May 17, 1947

ASTRONOMY

Date With Shadow May 20

A total eclipse of the sun will last almost four minutes at Bocayuva, Brazil. Astronomers hope to learn about the sun through its concealment.

By JAMES STOKLEY

(*Mr. Stokley is the Science Service staff correspondent covering the eclipse.*)

➤ ON Tuesday I have an appointment with a shadow and I am flying some 5000 miles to meet it. This is the shadow of the moon, now far out in space, but on Tuesday, May 20, it will touch the earth at sunrise in the Pacific Ocean, off the coast of Chile. In a few hours it will cross South America, the Atlantic Ocean and central Africa, ending at sunset in Kenya.

My destination is Bocayuva, Brazil, about 400 miles north of Rio de Janeiro, where the shadow arrives at 9:34 a.m. by their Eastern Brazilian time, which is two hours later than eastern standard time. At this location the shadow will take about 3 minutes and 50 seconds to go past, so there will be a total eclipse lasting that long, during which the sun will be covered.

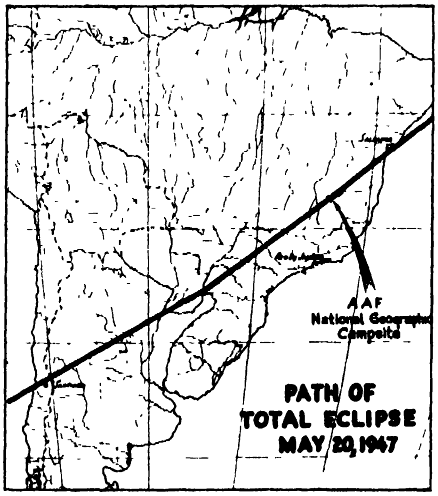
It is for those 3 minutes 50 seconds that a score or so of astronomers and a larger contingent of army men have already gone to Bocayuva to set up a temporary base from which to observe this eclipse. Nearby will be expeditions from New Zealand, from England and other parts of North and South America.

Why should one travel so far just for the sake of not seeing the sun for a few minutes? The reason is that in hiding the sun reveals itself. Its outermost layer, called the corona, is so faint that the glare from the inner part normally blots it out. If we were observing from the moon, or from a rocket ship high above our atmosphere, one would only need to hold up his thumb at arm's length so that it covered the sun's disk, and the corona would appear. But from the earth's surface the air around the sun scatters so much light that even this stunt does not suffice. A few years ago, however, a young French astronomer named Bernard Lyot, devised an apparatus called the coronagraph. The Harvard Observatory has one of these at its high-altitude station at Climax, Colorado. With it the brightest inner parts of the corona can be observed without an eclipse. But still the corona can be observed in its entirety only at a total eclipse.

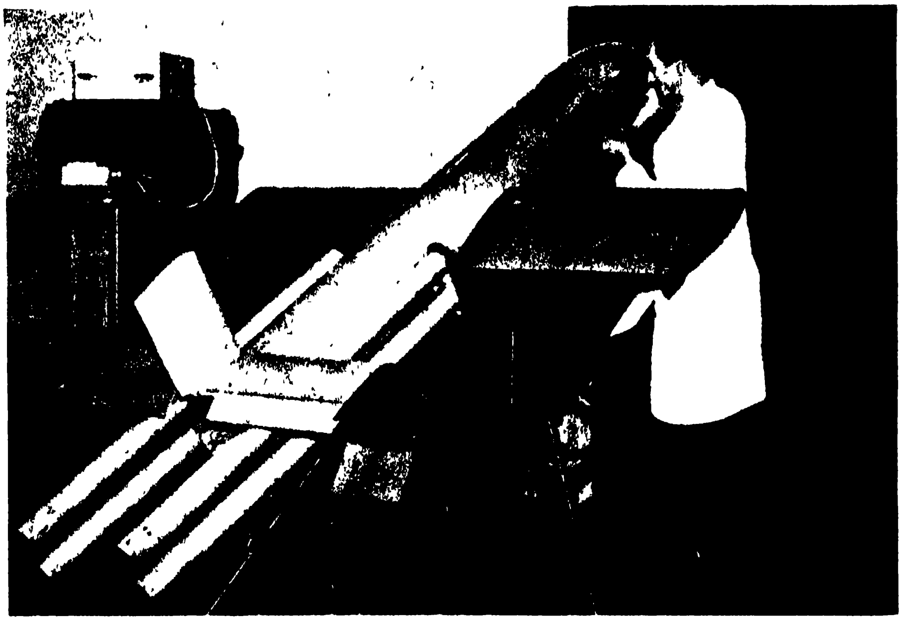
The corona is a puzzling affair. Some observations of its light seem to indicate that it is at an exceedingly high temperature, for the atoms of which it is made are very much broken, or ionized, a thing which ordinarily requires high temperatures. However, this is much hotter than the solar surface itself, so there must be some other explanation, and perhaps records made with cameras and spectrographs on the 20th may give a further clue to what is going on.

We have a fair idea of what we will see when the eclipse happens. The shape of the corona changes with the number of spots on the sun, and these vary over a cycle of about ten years. The first total eclipse that I saw, in January, 1925, was nearer the time of sunspot minimum, and then there were long streamers of the corona. This will be more like my third eclipse, which I saw from a freighter in mid-Pacific in June, 1937, for the record time of 7 minutes 6 seconds. Then as now it was close to a time of maximum spottedness, and the corona should be more round.

Science News Letter, May 17, 1947



TOTAL ECLIPSE—This map shows the path the sun's eclipse on May 20 will take and the campsite of the expedition from this country.



A-BOMB DEFENSE?—The "Stooge", first radio-controlled rocket missile developed in Britain, may be a possible defense against bombers carrying atomic bombs. It has an endurance of 40 seconds, a range of about eight miles, and a speed of over 500 miles per hour.

ACOUSTICS

Music Terms Confusing

Scientist tells musicians that symbols of music need to be simple for scientific use. Music for hospitals and industry proves valuable.

➤ THOSE MUSICAL notes which confuse the beginner on the piano drew fire from another quarter. A scientist termed the musician's symbols "worse than inadequate" for scientific use.

M. F. Meyer of Miami, Fla., told the Acoustical Society of America that musical terms in "fractions" are no help to science, either. He called for a clear, simple numerical system to replace the musician's present terminology.

Music may be "written for the soul" but musical experience is a scientific matter, Prof. Meyer explained.

"The causality of musical experience can be no other than basic facts of neurological chemistry," he declared.

Science News Letter, May 17, 1947

Healing Music Needs Study

➤ ALTHOUGH music is used in some hospitals, more study is needed to discover how music can be used to aid healing, a group of scientists cautioned at the Acoustical Society meeting.

R. C. Lewis of the War Department Special Staff, Washington, D. C., Dr. Harold Burris-Meyer, Stevens Institute of Technology in Hoboken, N. J., and R. L. Cardinell of Muzak Corporation, New York, N. Y., said that a "considerable amount of circumstantial evidence has been accumulated testifying to potential values in music as a therapeutic aid."

Reporting that Russia, England and possibly Italy are also doing some work on music and medicine, the scientists urged an organization at the national level for research on the problem.

Science News Letter, May 17, 1947

Hearing Music At Work

➤ MUSIC in industry also needs more scientific study, Mr. Cardinell and Dr. Burris-Meyer reported. They said that the number of people hearing music while they work jumped from a few hundred to an estimated 5,000,000 in six years.

They warned against "haphazard approaches" to the use of music, but added that increased production and better relations between employees and employers have been demonstrated.

Science News Letter, May 17, 1947

AERONAUTICS

Artificial Night Sky Improved for Students

➤ AN IMPROVEMENT in the artificial night sky under which aviation students in Link trainers do their simulated flying is the subject of patent 2,420,048, assigned to Link Aviation, Inc., by the inventor, H. A. Marsh of Boston. It changes the apparent rate of motion of the stars according to the direction of flight.

Science News Letter, May 17, 1947

ARCHITECTURE

Space-Saving Hangar Designed for Efficiency

➤ A SPACE-SAVING hangar for servicing the giant airplanes that dominate today's skies has been designed by A. S. Miller, C. W. Frank and R. R. Hagglund, all of Minneapolis. They have just been granted U. S. patent 2,420,186 on their plan.

The design is predicated on the fact that most of the airplane parts that need servicing—engines, steering gear, etc. —are located forward. Accordingly, the building is approximately triangular, with vaulted roofs forming a kind of tight trefoil pattern. The forward ends of three planes are run under these three roofs, and sliding sectional doors run up to about mid-fuselage. The middle sections have semicircular pieces cut out of their free edges, which meet to form a circle around the fuselage. A soft blanket or curtain helps form a closer fit.

Separating the three hangar segments is a Y-shaped building consisting of three long arms mutually subtending angles of 120 degrees. This provides space for shops, administrative offices, etc.

The inventors point out that a new field with little traffic can start with one segment, adding others as conditions justify new construction. They also claim considerable economy in heating during the winter, and point out that cargo loading and passenger embarkation can be carried on under shelter.

Science News Letter, May 17, 1947

AERONAUTICS

Flashes Light Runways

Krypton lighting system will provide the link in all-weather flying and make landings safer. Flashes penetrate dense weather for 1,000 feet.

➤ "BOTTLED lightning" is the key to a new approach and runway lighting system. It is the missing link in all-weather flying. It fills the gap between instrument flying through overcast with radio and radar aids and the actual touch on the runway which the pilot must make with the help of his own eyes.

The lighting system is far more powerful than any previously developed, claim Westinghouse engineers responsible for the system. The lights are called the world's brightest. They have 3,300,000,000 peak candlepower each, they declare. The lights produce lightning-like flashes strong enough to penetrate any weather for at least 1,000 feet.

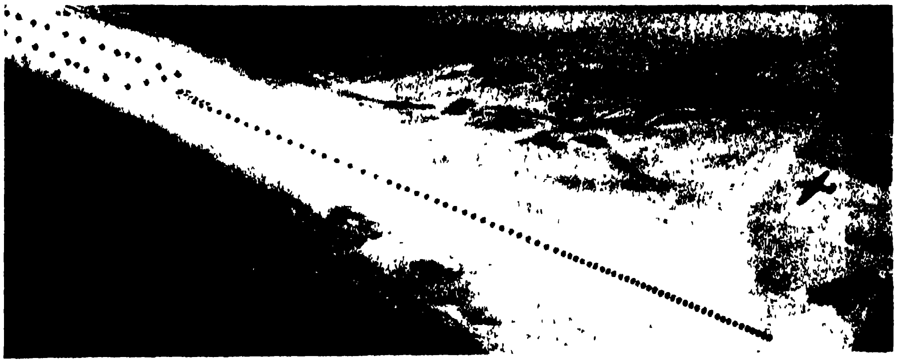
When the new system is used an approaching pilot will be guided in zero-zero weather by instrument means to a proper position at the outer end of the approach lane. Then he will be able to see the long line of 72 brilliant approach lights. They guide him to the runway. The system uses another combination of lights to tell him whether the runway is clear, while a third set brilliantly lights the landing strip.

The bottled lightning is a lamp four inches long which is a quartz tube filled with krypton, one of nature's rarest gases. When the impact of a surge of electricity heats the gas to incandescence, the lamp flashes with an all-out brilliance of 9,000,000 candlepower per square inch. A reflector and an optical system in the lighting fixture magnifies the flash to three and a third billion beam candlepower, Westinghouse scientists state.

Thirty-six of these krypton flash units are placed in line alternately with 36 new neon units for a distance of about two-thirds of a mile along the approach path. When flashed one after another, the lights appear as a stroke of lightning to the pilot. It flashes 40 times a minute, toward the runway.

The neon lamps, each about two feet long and the size of a fountain pen, may be operated as steady burning lights having 100 or 1,000 or 10,000 candlepower, as fog conditions demand. When used as flashing units, these lights produce 100,000 or 10,000,000 candlepower, whichever is required. The runway itself is lighted by lamps about 100 times brighter than those now in commercial use. These brilliant approach and runway lights need be used only when weather conditions require.

Science News Letter, May 17, 1947



BOTTLED LIGHTNING—As the airplane at the right approaches for its landing, the pilot will see the flash of 72 lights. The green light or red cross at the head of the runway is a last minute traffic director.

AGRICULTURE

2,4-D Saves Hand Labor In Tobacco Cultivation

➤ 2,4-D and related growth-control chemicals promise to make it possible to grow tobacco without a great deal of the tedious and costly hand labor now involved in one phase of its cultivation—the job known as "suckering". This promise has developed as a result of experiments carried out by Dr. Robert A. Steinberg of the U. S. Department of Agriculture, at the great federal experiment station at Beltsville, Md.

In growing tobacco, it is customary to decapitate the plants at blossoming time, removing the flowering shoot. This ordinarily stimulates the growth of side branches, or suckers, that spring from buds formed just where the leaf joins the stem. It is now necessary to go through the field several times, picking off these suckers by hand. This is the job known as suckering.

Dr. Steinberg grew several lots of tobacco plants under exactly similar conditions. After topping, he left two lots unsuckered, and kept two lots suckered by hand, in the customary way. The others he treated with a dab of 2,4-D or other growth-control chemical, applied on the cut surface of the stem, after topping.

All the chemically treated groups of plants produced greater weights of tobacco than did the hand-suckered control groups, which in turn outyielded the plants on which the suckers had been permitted to grow. Increases in leaf yield by the chemically treated plants ranged from 11% to 20%. 2,4-D produced the largest yield increase. However, another chemical, alpha-2-chlorophenoxypropionic acid, came within a fraction of a per cent of tying its performance.

These results were obtained in a relatively small-scale experiment. The method will be applied on a full field scale this season, with two kinds of tobacco, to decide whether hand suckering can be supplanted by chemical growth-control in commercial production.

Detatils of Dr. Steinberg's first experiment are presented in *Science* (Apr. 25).

Science News Letter, May 17, 1947

ENGINEERING

Helping Engine for Trucks

➤ AN AUXILIARY engine for overloaded trucks and buses to enable them to maintain normal speed on stiff grades, is the invention on which patent 2,419,929 has been granted to the late George D. Wilcox of Detroit. The second engine delivers its power to the same gearbox as the main engine, but is held idle by an automatic control until it is needed.

Science News Letter, May 17, 1947

PUBLIC HEALTH

Doctors Expect Another Big Polio Epidemic

➤ ANOTHER BIG polio year is expected this summer by infantile paralysis experts. Without making any specific predictions, they told members of the American College of Physicians that there will probably be a lot of polio in the United States and elsewhere for a number of years to come.

One authority, Dr. Thomas Rivers of the Rockefeller Institute was quoted as having said that he feels we are in a pandemic. Pandemic is the term scientists use to describe a world-wide epidemic, such as the influenza outbreak of 1917-1918.

During the last four years there has been the largest total number of cases of polio in the United States in the history of the nation, Dr. Edward A. Piszczek of Chicago reported.

The increase is not just a matter of more accurate reporting. Doctors actually are seeing more cases, Dr. Piszczek said. The virus germ that causes infantile paralysis has grown more virulent. Until it begins to lose some of its virulence, we shall go on having lots of polio cases every year, the authorities believe. Since the beginning of this year 33 states have reported more polio than for the same time last year. Authorities are watching with special concern increases in some states which for the past four or five years have had very little polio.

Doctors are also getting better results in treating polio, though there are no "miracle drugs" for the disease.

Science News Letter, May 17, 1947

WILDLIFE

Mountain Lions Prefer Porcupine to Veal

➤ MOUNTAIN LIONS have unaccountable tastes. They seem to prefer porcupine to veal. Despite their ill reputation as killers of livestock, bristles of porcupines were far more abundant in 2,000 samples of mountain-lion food wastes examined by Dr. Frank C. Hibben of the University of New Mexico than were hairs of domestic animals. To be exact, he found evidences of feeding on porcupine in 5.8% of all cases, while remains of cattle, horses and mules together made up only 1.6% of all lion meals.

In Arizona and New Mexico, where Dr. Hibben carried on most of his studies, deer are the mountain lion's principal food, constituting 82% of the total supply. Examination of lion-killed deer carcasses which he was able to find indicated that in many instances the victim had been crippled or otherwise partly disabled, thus making it an easier prey. If this should prove generally the case, there would be some support for the claim often made, that predatory animals serve as agents of natural selection, culling out the weaker and less desirable specimens of game animals.

Nor is the mountain lion a wasteful feeder. One deer carcass serves him for about ten meals.

Other animals on which the big cat preys include rabbits, prairie-dog, badger, fox, coyote, beaver, elk and an occasional wild rat.

Just as the mountain lion is not deterred by the porcupine's bristles, neither is he stopped by chemical-warfare defense There was plenty of evidence that he eats skunks.

Science News Letter, May 17, 1947

ECOLOGY

If Region Is Colder, Animals Are Bigger

➤ "THE COLDER the bigger" expresses a general rule for warm-blooded animals, Dr. Gordon Alexander of the University of Colorado pointed out to the meeting of the Southwestern Division of the American Association for the Advancement of Science. Under the title of Bergman's Principle, this rule has long been known to hold for distribution in latitude: the biggest animals of a given species are found farthest north.

Now this rule has also been found to hold good for distribution in altitude, among non-migrating species. In temperate climates, the up-and-down seasonal migration of mountain populations beclouds the issue. But in recent critical examinations of the stable bird populations of the high mountains of New Guinea, the biggest specimens were always found at the highest levels, where the weather was the coolest.

Strangely enough, however, the rule is inverted when it comes to cold-blooded forms, such as insects. Mountain populations of a given species of grasshopper were found to have the biggest specimens nearest the base and the smallest near the summit.

Science News Letter, May 17, 1947

IN SCIEN

PHYSICS

AAF Uses Wing as Antenna For Reducing Radio Static

➤ THE WING of an airplane can be made to act as an antenna to reduce static.

Exciter coils have been installed between the inboard engines and the fuselage of planes by Wright Field engineers of the Air Materiel Command. The coils make the wing itself serve as the antenna. This does away with the standard wire antennas.

Icing and oscillation of the wire antennas will produce static. Army Air Force engineers believe the new system will reduce the static.

Another disadvantage of the wire antenna is the drag which cuts down speed. With the wing serving as the antenna, this difficulty is overcome.

A flush-mounted slit antenna at the side gunner's position in a B-17 bomber has also been installed experimentally as another answer to the antenna problem. Reported to be adaptable to most types of aircraft, this antenna is planned for use with the navigational aids which guide the pilot down safely in bad weather.

Science News Letter, May 17, 1947

PHYSICS

Beta Ray Spectrometer To Aid Isotope Study

➤ NEWEST TOOL for scientific study of radioactive isotopes is a beta ray spectrometer developed at the National Bureau of Standards.

The new spectrometer has a magnetic lens which can form images with electrons sent off by a radioactive material. Beta rays are high speed electrons, negatively charged particles which are a part of all atoms. The instrument also will aid in the study of gamma rays, the short, powerful X-ray-like radiations which are more penetrating than beta rays.

First research job for the beta ray spectrometer at the Bureau of Standards will be in measuring the penetrating power of gamma and beta rays from the radioactive isotopes now available to scientists from chain-reacting piles.

Science News Letter, May 17, 1947

E FIELDS

CHEMISTRY

Alcohol Vapor Is Used To Purify Lactic Acid

➤ TWO CHEMISTS of the U. S. Department of Agriculture Regional Research Laboratory at Philadelphia, Edward M. Filachione and Charles H. Fisher, have developed a method of purifying lactic acid, much used in food and beverage industries, out of the crude fermented mixtures in which it is produced. They bubble alcohol vapor through the liquid; the alcohol picks out the lactic acid and leaves the impurities behind. Later it is separated from the lactic acid, and re-used. Patent 2,420,234, granted on this invention, is assigned royalty-free to the government.

Science News Letter, May 17, 1947

ACOUSTICS

Musicians Can Calculate Harmony on Slide-Rule

➤ DON'T BE SURPRISED if you see a musician pull out a slide-rule and start making calculations before he begins playing. And future Beethovens or Irving Berlins may sit down with a slide-rule when they compose new pieces of music.

The slide-rule for music was presented at the Acoustical Society of America meeting in New York by L. E. Waddington of C. G. Conn, Ltd., Elkhart, Ind. He explained that musical data and the science of sound as related to music can be adapted to a slide-rule because they involve relationships which are the same for any key.

"Musicians," Mr. Waddington said, "are seldom concerned with the mathematical background of their art, but an understanding of the underlying physical principles of music can be very helpful to the student in considerations of problems related to harmony, intonation and general band instrument design."

Information adjusted on the slide-rule includes chord structures, scale building, instrumental transportation, interval relations and degrees of scale.

Music of the 17th and early 18th centuries was played as it actually sounded for scientists at the Acoustical Society meeting. W. B. White of the School of Pianoforte Technology, Chicago, explained that we use a different system of tuning keyboard instruments than was used when the music he played was composed.

Today's piano tuning, called the equal temperament system, was first demonstrated by Sebastian Bach early in the 18th century. Before Bach's time, tuning known as the mean-tone system was used.

Mr. White demonstrated the difference between the systems by playing music composed before instruments were tuned the way they are now.

Science News Letter, May 17, 1947

ANIMAL HUSBANDRY

Medicine Fattens Hogs Quicker on Less Corn

➤ A SURE-FIRE country joke, back when Grandpa was a boy, told of the old farmer who accidentally spilled his wife's bottle of Anti-Fat into the slop he was getting ready for the hogs—and then couldn't understand why they didn't put on weight.

Now it looks as if that old gag is going to be reversed, by giving hogs medicine that will make them get fat quicker on less corn. The medicine is thiouracil, a drug that checks the action of the thyroid gland. A really active thyroid is the gland that gives people (and sometimes pigs) that Cassius-like lean and hungry look.

Scientists at the New Jersey Agricultural Experiment Station added a little thiouracil to the rations of ten 200-pound hogs, and kept ten others on the same rations but without the drug, as controls. After 38 days the group of hogs that got the thiouracil gained a total of 610 pounds, as compared with a 470-pound gain by the control group.

The greater weight gain was made economically, too. The thiouracil group ate 524 pounds of feed for each 100 pounds of gain, while the controls used 723 pounds of feed for each 100 pounds of added weight.

Thiouracil is not on the market yet, but farmers who want to try it, once it is available, are warned not to use it on young pigs; it will stunt their growth. The best time to use it is during the last 45 days of the fattening period.

Science News Letter, May 17, 1947

PLANT PHYSIOLOGY

New Weed Killers Affect Root Growth in Plants

➤ DDT, 2,4-D and other new chemical weapons against insects and weeds will have to be used with an eye to their effects on crop plants, it appears from studies reported before the meeting in Colorado Springs of the Southwestern Division of the American Association for the Advancement of Science by Dr. J. L. Fults and Dr. M. G. Payne of Colorado A and M College.

Rather heavy doses of DDT in pots of soil induced bean plants growing in them to throw out an extra-heavy web of secondary roots. On the other hand, a fairly close chemical relative known as Colorado 9 reduced the secondary root below normal.

Even low concentrations of 2,4 D in soil had unfavorable effects on the nodule bacteria that capture nitrogen from the air for plants of the bean and clover family. The two researchers cited the work of another pair of scientists who had discovered that DDT has a discouraging effect on the same useful bacteria. DDT's chemical cousin, the insecticide Colorado 9, does not depress the nodule bacteria.

Science News Letter, May 17, 1947

CHEMISTRY

Chemicals Make Water Shine In Dark to Aid Navigation

➤ CHEMICALS that create a bright glow when dropped on water, of great possible usefulness to seamen and trans-ocean flyers, are the subject of patent 2,420,286, issued to three chemists working in the laboratories of the American Cyanamid Company of New York, Dr. H. T. Lacey, H. E. Millson and F. H. Heiss. Among possible uses are marking the surface for a plane making an emergency night landing at sea, giving a "seamark" for navigational purposes for either ships or planes, and showing the location of lifeboats or liferafts to searching planes in the dark.

A typical formula consists of 3-aminophthalhydrazide, sodium perborate, potassium ferricyanide and trisodium phosphate. The ingredients, ground to fine powder, are mixed dry and preferably formed into tablets or cakes with a binder. Only on contact with water do they react to produce chemiluminescence.

Science News Letter, May 17, 1947

ARCHITECTURE

Metallic and Plastic Homes

Aluminum, steel and plastics will rival wood for houses. Most new housing materials will be used in combination with some wood.

By A. C. MONAHAN

Wood emerges from war years with many rivals in the building field. Houses of steel, aluminum, plastics and lightweight concrete may be expected in large numbers in the future. "Conventional" Americans may prefer the traditional house of lumber that dates back to log cabin days, but others will take advantage of the newer materials.

Heavy war drains on lumber and an increasing scarcity of growing timber are two of the important reasons substitutes have been developed. To these may be added the struggle of wartime metal and plastic producers to find a continued market for the products they learned to make in large quantities, such as aluminum and magnesium for war planes and plastics for hundreds of applications.

Then there are many little-known but plentiful minerals suitable for use in building materials, particularly in lightweight concrete blocks and in wallboards. They are already invading former lumber fields. Also there are new resins by which former unusable vegetable matter and metals are combined into building panels of great strength and durability.

Combined With Wood

Most of these newer materials will be used in combination with some wood. There will always be a market for all the lumber that America can produce. Flooring of wood, for example, will remain the preferred material of many housewives, but others will like floors of tile, linoleum, rubber and plastic spreads. Even concrete flooring will grow in favor now that scientists have given it "spring" by the addition of asphalt in the mix.

Aluminum promises to be one of America's principal building materials of the future. Several aluminum houses are now being constructed in quantities. The light metal has several advantages. Dwellings of aluminum can be constructed to resemble in appearance the homes that are traditional in America. The metal resists all weather action, and can be used painted or unpainted as desired.

A plentiful supply of aluminum is assured. Giant aluminum manufacturing plants erected during the war to turn out the vast quantities of this material needed in war planes are still available for civilian production. Also, by a new process developed by the National Bureau of Standards, the metal can be obtained from common kaolin clay without dependence on imported bauxite.

During the war, America produced both in 1943 and 1944 well over 1,500,000,000 pounds of this light aluminum metal each year. Production in 1945 dropped to less than a billion pounds due to the cancellation of gigantic orders for warplanes following V-J Day. Many plants were closed because few then foresaw the coming demands for aluminum in the building field and for many other uses, ranging from railway cars to electric wiring to meet a shortage of copper.

Aluminum Houses

As examples of aluminum houses now under production, two may be mentioned. One is the so-called Butler-Built of conventional design, and the other is the Fuller house which is circular in shape. This circular house has its sidewalls and partitions of aluminum suspended from a concealed central steel mast with radiating ribs somewhat like an umbrella.

A typical Butler-Built house, recently on display in Kansas City, Mo., the home of the Butler Manufacturing Co., is a two-bedroom structure 24 by 33 feet in overall dimensions. It contains a living room about 17 by 12 feet in size, a kitchen with a dining area, a bath, and a central utility room which can be used for a heating plant if no cellar is dug.

Steel Roof

The roof structure is steel over which any type of roofing may be placed. Sidewalls are aluminum panels with four-inch flanges used in uniting the panels. They form four-inch studs extending into the interior of the room to which interior walls of aluminum or other material may be attached. Flooring is wood, asphalt or tile. Interior and exterior can be painted any color desired, or may be left unpainted.

Insulation in the walls, floor and ceiling help make the building warm. In addition, there is a reflective value in the aluminum wall surfaces that assists the house to retain its interior heat in cold weather, and to keep away summer outside heat.

The circular Fuller house has some special values to offset its unconventional shape. A circular wall incloses more square feet of inside space than a rectangular or square construction with an equal

EFFICIENT—Prefabricated houses such as this home are designed for efficiency.

wall-length. Also the shape is claimed to make heating and ventilation easier and more uniform.

This house, 36 feet in diameter, has 1017 square feet of floor space, enough for a combined living and dining room, two bedrooms, two baths and an entrance hallway. It only weighs four tons, one-tenth the weight of conventional frame houses. Although the sidewalls are light aluminum, the building is warm because it is well insulated. It is also strong, and the builder says can withstand a 180-mile gale.

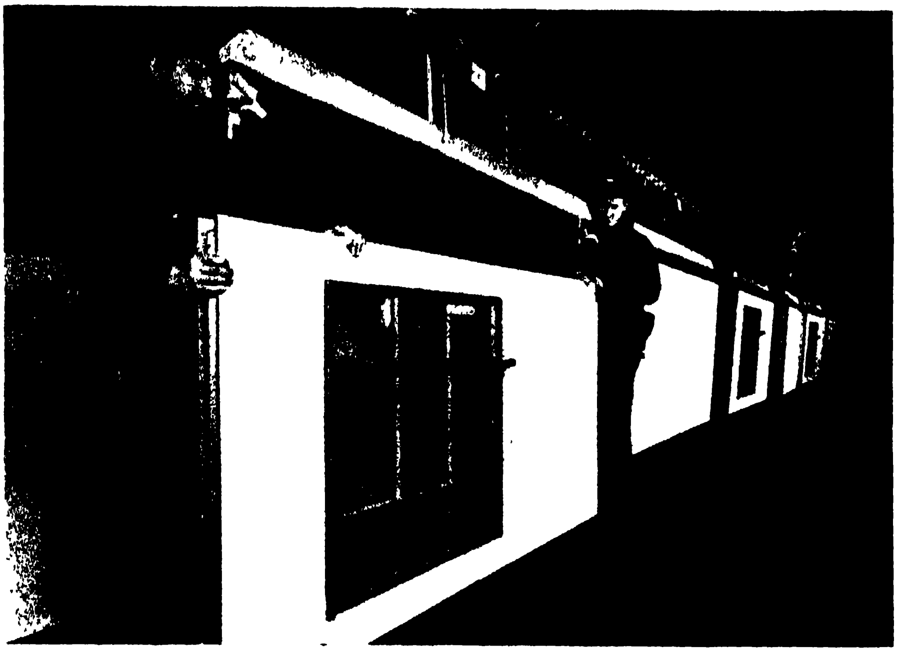
In addition to what are called all-aluminum houses, there are many others in which aluminum is used as outside sheathing and roofing, and as inside partitions. The Reynolds Metal Co., of Louisville, for instance, is making aluminum clapboard siding, weatherboard siding, shingles and strip roofing, also corrugated roofing and siding. Such rust-proof, fire-proof metal sheeting can be placed over almost any type of outside wall.

Most of the newer building materials are better suited for fabrication within factories for so-called prefabricated homes than they are in "on-the-job" construction. This is because metals usually require machinery for cutting and shaping, and panels of wood or wood substitutes, bonded by resins, require pressure to perfect good union. Light-weight concretes are on-the-job materials, except when used to form exterior or interior panelling.

Light, Strong Panels

Factory-built panels in large sections ready for assembly into complete houses can be much lighter than ordinary construction and still as strong if properly fabricated. The process used by Gunnison Homes, Inc., may be cited as an example. Gunnison is one of the well-known builders of prefabricated houses, putting out buildings of eight basic sizes, any of which can be varied in appearances by orientation and minor changes.

The sidewalls of the Gunnison houses are panels strong enough to bear the weight of the roof and ceilings. These panels contain lumber frames of material considerably lighter than ordinarily used in house construction. Ply-wood sheets are attached to the frames with a thermosetting phenolic resin. The space within is filled with chemically treated rock wool bat insulation. The result is a durable construction, stronger than nailed structures even if much less in thickness, and one that is highly resistant to the passage of heat.



HOUSE IN A HURRY—Enough panels for a complete house come off the conveyor every 25 minutes.

Magnesium, plentiful and much lighter than aluminum, is rapidly coming into use in the construction of airplanes, canoes, car bodies and many other objects. It may soon be used in building construction, particularly alloyed with aluminum.

Titanium is another light metal with possible wide usage in construction fields now that a method has been developed for producing it from its very plentiful ores. It is about twice as heavy as magnesium, but still much lighter than steel. It is the ninth most plentiful chemical element in the world, and is exceeded only by iron, aluminum and magnesium in metals suitable for engineering uses. It is already widely used in a chemical compound. Titanium oxide is one of the principal pigments used in white paint.

There are many minerals that can be used as aggregate, or fillers, to make light-weight concrete. Vermiculite gives a concrete weighing only from one-eighth to one-third the blocks or panels of equal size made with sand or gravel. Others range in weight between those of this mineral and those of the customary sand and gravel.

The plentiful light-weight aggregate materials suitable in construction that are now available in the United States include haydite, foamed slag, cinders, pumice, diatomite, perlite and vermiculite. These have all been tested by the National Housing Agency and are recommended by that government office. Most of them are materials that expand greatly by special treatment, usually by heat.

Haydite is made from a great variety of clays and shale. Foamed slags are made by treating hot molten blast-furnace slag with water. Pumice is a siliceous mineral of volcanic origin. Diatomite is composed of deposits of the siliceous shells of microscopic aquatic plants called diatoms. Perlite is a natural volcanic glass. Vermiculite, mined by at least a dozen companies widely distributed in America, is a mineral that expands up to 30 times its original volume by a simple heat treatment.

Science News Letter, May 17, 1947

CHEMISTRY

Vacuum-Steam Treatment Makes Milder Tobacco

➤ TOBACCO is made milder in its smoking properties, and its final color closely controlled, by a vacuum and steam treatment on which A. J. Berger and H. S. Greene of Cincinnati have taken out patent 2,419,109. Before being placed in the treating chamber, the tobacco is moistened. Then air is pumped out, and steam is admitted to the chamber, where it is held for an hour at a temperature of from 235 to 260 degrees Fahrenheit. This produces the mildness. Color is controlled by the degree of preliminary moistening: the damper the tobacco, the darker it becomes.

Science News Letter, May 17, 1947

ENGINEERING

Helicopters Lay Pipelines

See Front Cover

➤ Helicopters demonstrated their ability to lay pipe lines in "impossible" places at an Army Engineer Corps field day at Ft. Belvoir, Va. Since modern armies move more on their gasoline tanks than on their traditional bellies, a place for the "windmill planes" in keeping tanks, planes, trucks and jeeps supplied seems assured.

Two types of pipe were accurately dropped by two helicopters. The first was a three-inch hose of solvent-proof synthetic rubber. Five hundred feet of this was stowed in a special container under the helicopter body, the outer end attached by a line to a small anchor. When the anchor was dropped the line pulled out the hose, which was laid out straight as a string in a matter of seconds. This type of temporary pipe line can be used for getting urgently needed fuel across rivers, narrow canyons and other difficult obstacles.

The second is a more permanent type, made of 20-foot sections of aluminum tubing six inches in diameter. The helicopter carried 12 of these in two bundles, which it dropped to the ground while hovering at a height of about 10 feet. A ground crew assembled the sections, uniting them with a newly designed clamp that requires only two bolts. The sections are amazingly light for their size, weighing only 60 pounds apiece. One man can easily lift and carry one of them.

Gasoline pipe lines played an important part in the recent war, especially in the campaigns through France and the Low Countries and into Germany. However, the weight of the steel sections, which had to be moved by truck, was a severe handicap. About 80% of the effort expended by the Engineers in getting pipe lines laid went into building roads for hauling materials. With the new featherweight pipe, capable of easy air transportation, this difficulty should not recur.

Science News Letter, May 17, 1947

NUTRITION

Invalid Food Nourishes With Less Nitrogen Content

➤ THE OLD-TIME rhymester who wrote, "I cannot eat but little meat" should have attended the meeting of the American Chemical Society's division of medicinal chemistry. A new food preparation, described as a hydrolyzate of casein, was declared by Dr. Charles F. Kade, Jr., of Frederick Stearns and Company, to be able to maintain the necessary protein nourishment of weakened patients at a lower nitrogen intake than usual. This enables such patients to rebuild their tissues with a minimum load on their digestive organs.

Science News Letter, May 17, 1947

The felted *hammer* in a piano possesses a unique property; whether striking heavily or lightly, it will always, at the same touch on the key, produce the same tone in volume and quality.

Do You Know?

Gas is the simplest fuel to burn; fuel oils require atomization.

Straw, oat hulls and whey were used to produce *fats* in Germany during the war; a mold was used in the proceess.

Carbon granules made from anthracite *coal* are used in telephone transmitters.

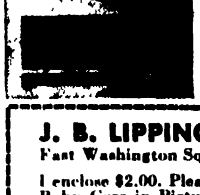
A new form of an old transparent *plastic* filters out harmful ultraviolet radiation that causes sunburn; it is suitable for aircraft enclosures and tops of sightseeing buses.

Fluorine, for many years an unharnessed, unruly chemical element, but put to many uses during the past few years, was first isolated in 1886.

Modern *shampoo* preparations are no longer soaps but chemical products containing sulfated castor or olive oils and sulfated fatty alcohols; the mixture is a superior cleanser and it rinses clean.

Activated *silica* sols, a new chemical engineering tool, are widely used in treating raw water; other uses, including treatment of sewage, oil wastes, and papermill white water, are being developed.

Cutting edges of cemented carbide *tool* tips are sometimes injured by the presence of moisture in chlorinated and sulfurized cutting oils; the moisture weakens the tip by attacking the cobalt binder used.



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BIOLOGY

Egg Cells Transplanted

Superior babies-to-be have been transplanted into the body of a foster mother rabbit. Development may become valuable in livestock production.

➤ "REFRIGERATOR babies" are science's latest step toward practical production of more and better livestock. This newest step marks an advance in the already-developed technique of transplanting before birth superior babies-to-be into mothers of just ordinary breeding.

In experiments at the Worcester Foundation for Experimental Biology in Shrewsbury, Mass., Dr. Min-Chueh Chang kept egg-cells, extracted from female rabbits, at low temperatures for several days. Then he transplanted them into the bodies of foster-mother rabbits. The little rabbits flourished and grew big, and finally were born just as though their real mothers had seen them through their pre-natal life.

This represents another step in advance of "test-tube" babies, produced by the fertilization of fresh egg cells taken from the mother animal's body and immediately implanted into another female that serves as foster-mother.

Applied to larger and more valuable animals, the technique can become very important, especially to the livestock industry. Dr. Chang calls attention to this future possibility in his report to the British journal, *Nature* (May 3).

In the experiments, egg-cells were removed from female rabbits and stored at low temperatures, ranging from 32 degrees to 59 degrees Fahrenheit for periods of from 24 to 168 hours. Then they were warmed up to approximately normal body temperature and held there for 24 hours, to see whether normal cell-division, or cleavage, would occur. Those showing normal cleavage were transplanted into the foster-mother animals' bodies, and part of them developed into normal rabbits in due time.

Best results were obtained with egg cells that had been kept at 50 degrees Fahrenheit, but at least some of those stored at freezing point (32 degrees) also developed.

The transplantation technique used in these experiments was originally developed by Dr. Gregory Pincus, in whose laboratory Dr. Chang worked.

Science News Letter, May 17, 1947

PHYSICS

Rat Trap Slays Victims By Electricity "Set" Tube

➤ THE WORLD should beat a wide path to the door of Wilbur E. Lake of Fostoria, Mich., for he has invented a simple trap that kills any number of rats with electricity and needs no re-setting. It consists of a tube big enough for a rat to enter, held at a sloping angle alongside stairs or shelves. Part way down is a container holding an enticingly scented bait. Within the tube also are a pair of electrodes. When the rat passes between these he completes the circuit and is killed. His dead body slides down the slope—and the trap is ready for its next victim. Patent number on this invention is 2,417,601.

Science News Letter, May 17, 1947

When airplanes fly at supersonic speeds, temperatures in cockpits may rise high above that of boiling water because of heat generated by friction, an Army air surgeon predicts.

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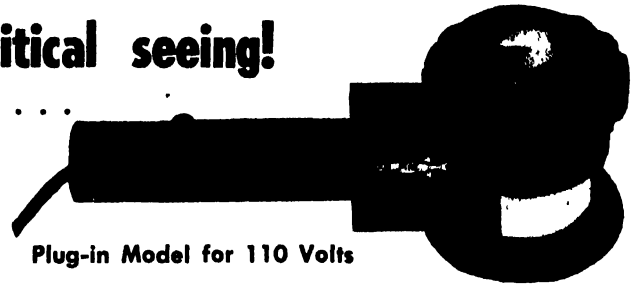

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Fives and Threes

➤ COUNT PETALS on as many kinds of flowers as you can find. Opposite the name of each, put down the number of petals its flowers show, thus: wild rose 5, violet 5, trillium 3, toothwort 4, star-grass 3, and so on. After you have made your list as long as you can, take a look at the numbers. Notice how they are dominated by 5 and 3.

Those two prime numbers are the trademarks of the two great divisions of the flowering plants. Five is the dominant number among the plants that come up with two seed-leaves, the dicotyledons, or for short, "dicots". Three is the mark of the plants with only one seed-leaf, the monocotyledons, or "monocots."

This "fiveness" is not confined to number of petals alone. The whole flower is apt to have its parts in fives or multiples of five—five sepals, five or ten stamens, five seed-chambers in the fruit. Similarly, the "threeness" of the monocots will run through all the structures. What appear to be six petals in lily, amaryllis, dogtooth violet and tulip are really three true petals surrounded by three sepals that have become petal-like. Botanists, to avoid splitting hairs, call them "perianth-parts."

Sometimes the petals or perianth-parts have become fused together, so that the corolla is bell- or trumpet-shaped, as in lily-of-the-valley and trumpet-creeper. Yet even here you are apt to find points or lobes on the margin proclaiming its origin—again threes (or sixes) and fives. And the inner structure of the flower, the stamens and the parts of the pistil, will be arranged according to the old basic numbers.

There are, of course, departures from the schemes of fives and threes. The mustard-and-cress family, for example, is so strongly four-petaled and four-sepaled that the group has been named the crucifers, or cross-bearers. Also there are flowers with petals so modified that it is difficult to tell anything about the basic number-scheme—Dutchman's breeches, for example, and the wild orchids. Also, there are some flowers that produce simply indeterminate numbers of all parts, such as waterlily, magnolia and anemone. But after you have lived with plants for a while you get to regarding these as exceptions or aberrations, and the five-and-three arrangement as the norm.

Science News Letter, May 17, 1947

Micromax Saves Observer's Time By Recording Solar Radiation

The Micromax Recorder shown above is one of two which are helping Smithsonian scientists measure solar radiation faster and more easily for the Army's tent research at Camp Lee, Va. It records radiation falling on an Eppley Pyrheliometer; the other Micromax, not shown, charts fabric temperatures beneath various glass filters. These instruments save nearly all of the time which would be needed for hand plotting of the same data.

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WILDLIFE

Abnormal Salamanders Have Extra Toes and Legs

➤ SALAMANDERS with supernumerary toes and even with whole extra legs were reported by Dr. David W. Bishop and Dr. Robert Hamilton, of the University of Colorado, to the meeting of the Southwestern Division of the American Association for the Advancement of Science. These little tailed relatives of toads and frogs had their extra toes on their hind legs only, and three individuals had extra hind legs, all of which had more than the normal number of toes.

These abnormal salamanders, 19 all told, were found in a small Colorado lake at 8,500 feet elevation. The two zoologists believe they represent a stock in which the tendency to produce "spare parts" is hereditary. They are continuing their studies, in an effort to discover what factors operate in the growth of supernumerary toes and legs.

Science News Letter, May 17, 1947

CHEMISTRY

New Gasoline Synthesis

➤ AN IMPROVED way to produce synthetic gasoline out of the carbon monoxide and hydrogen of water gas is covered by patent 2,418,899, issued to three New York inventors, E. F. Pevere, G. B. Hatch and E. E. Sensel, and assigned to The Texas Company. The improvement consists primarily in the addition of isobutane or other branched-chain hydrocarbon to the gas mixture. The product, the inventors state, has antiknock properties superior to those of previous synthetic motor fuels.

Science News Letter, May 17, 1947

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• Books of the Week •

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ALGEBRA FOR COLLEGE STUDENTS—Jack R. Britton and L. Clifton Snively—*Rinehart*, 529 p., $3. A complete development of algebra for college students whose mathematical preparation was weak.

THE AMERICAN SPECIES OF HYMENOPHYLLUM SECTION SPHAEROCIONIUM—C. V. Morton—*Smithsonian Inst.*, Contrib. from U. S. Nat. Herbarium, Vol. 29, Part 3, 62 p., paper, 30 cents. The results of 15 years study of more than 1,000 specimens of this genus of fern.

FUNDAMENTAL CHEMISTRY — Horace G. Deming—*Wiley*, 2nd ed., 745 p., illus., $4. This college text is designed to teach the student to think. It includes modern nuclear fission and transformation, the recently discovered elements, and a good coverage of antibiotics. It stresses accurate and precise definition as a necessity to clarity of thought.

GENERAL BOOKBINDING—Chris Groneman—*McKnight and McKnight*, 64 p., illus., paper, $1. Clearly illustrated, this project has been tested and most of the equipment can be constructed in school shop or home workshop.

GENERAL LEATHERCRAFT—Raymond Cherry—*McKnight and McKnight*, 108 p., illus., paper, $1.20. To help people interested in this pleasant hobby, it contains related information, operation sheets, projects and designs.

KNUDSEN A BIOGRAPHY—Norman Beasley—*Whittlesey House*, 396 p., $3.75. A portrait of achievement in America, this is a biography of the president of General Motors who held many important wartime positions.

MATHEMATICS FOR THE CONSUMER—R. Schorling, J. R. Clark, F. G. Lankfor, Jr.—*World Bk.*, 438 p., illus., $1.96. A new course in mathematics designed to help people cope with problems in daily living; spending money for food, shelter and material benefits, habits of thrift, investments, budgets, and interpretation of statistical data.

PHYSICS FOR THE NEW AGE—R. H. Carleton and H. H. Williams—*Lippincott*, 656 p., illus., $2.80. A high school text in basic physics emphasizing its place in modern developments: automobile, airplane, jet propulsion, electronics, television, radar, photography, and atomic science.

A POUND OF PREVENTION: How Teachers Can Meet the Emotional Needs of Young Children—James L. Hymes, Jr.—*Teachers Service Committee on the Emotional Needs of Children*, 63 p., illus., paper, 25 cents. Sponsored by the Caroline Zachry Institute of Human Development, this is one of a series of pamphlets to be prepared on this and related subjects.

THE PRACTICAL BREWER—Master Brewers' Assn. of Am.—*publ. by the assn.*, 228 p., illus., $2.50. This is a manual for the brewing industry.

PRECISION OF RING DATING IN TREE RING CHRONOLOGIES—A. E. Douglass—*Univ. of Arizona*, Lab. of Tree-Ring Research Bulletin No. 3, 21 p., illus., paper, 30 cents. Emphasizes the precision of the dating of individual rings by the use of the methods and procedures of dendrochronology.

60 YEARS WITH MEN AND MACHINES—Fred H. Colvin—*Whittlesey House*, 297 p., illus., $3.50. A history of the development of machinery since 1884. This period included the bicycle, the automobile, the airplane, railroads, new machine tools for industry.

THEORY AND APPLICATION OF RADIO-FREQUENCY HEATING—G. H. Brown, C. N. Hoyler, and R. A. Bierwirth—*Van Nostrand*, 370 p., illus., $6.50. Useful for industrial and radio engineers, this text will help both use this new industrial tool.

TRANSACTIONS OF THE WISCONSIN ACADEMY OF SCIENCE, ARTS AND LETTERS, vol. XXXVII, *publ. by the Academy*, 374 p., $4. Covering the year 1945, this volume contains articles on hares, grouse, mosquitoes, fish parasites, use of phemerol in treatment of bacterial fish diseases, creel census on the Brule River, and activities of the first year of the Wisconsin Junior Academy of Science.

THE WORLD GROWS ROUND MY DOOR—David Fairchild—*Scribners*, 347 p., illus., $5. This plant explorer has brought to fruit beside his door many of the plants he found abroad and acclimatized in America.

Science News Letter, May 17, 1947

GENETICS

Red-Green Colorblind Men Can Put Blame on Women

➤ MORE MEN than women are so colorblind that they can't tell the red cherries from the green leaves. But the men can blame women for their defect.

Men get red-green colorblindness from mothers who do not themselves have it. New confirmation for this scientific theory was found by Dr. R. W. Pickford of the University of Glasgow and reported to the British journal, *Nature* (May 3).

Among 191 men and 185 women with normal color vision, Dr. Pickford found more women than men have some difficulty distinguishing red from green. And women with colorblind men in the family are less sensitive than other women to these colors. The proportion of color-dull women was just about what would be expected if colorblindness is sex-linked and inherited from their mothers.

Science News Letter, May 17, 1947

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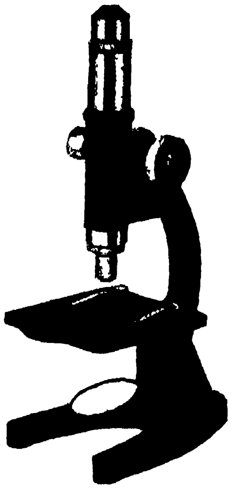


• New Machines and Gadgets •

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., Washington 6, D. C., and ask for Gadget Bulletin 362. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

⚙ *PAINT BRUSH conditioner is a container in which brushes are surrounded by a vapor evaporated from a felt pad lining. The vapor is a solvent for the paint, varnish or laquer in the brush, and softens hard-as-rock brushes in a few days, it is claimed, without injury to bristles.*

Science News Letter, May 17, 1947

⚙ *ICE CHEST, convertible into an electric refrigerator right in the home in one hour's installation time, is designed to make later payment of the mechanical feature easier. The factory-packaged electric unit can be bought when desired, and is designed for easy fitting into the former ice compartment.*

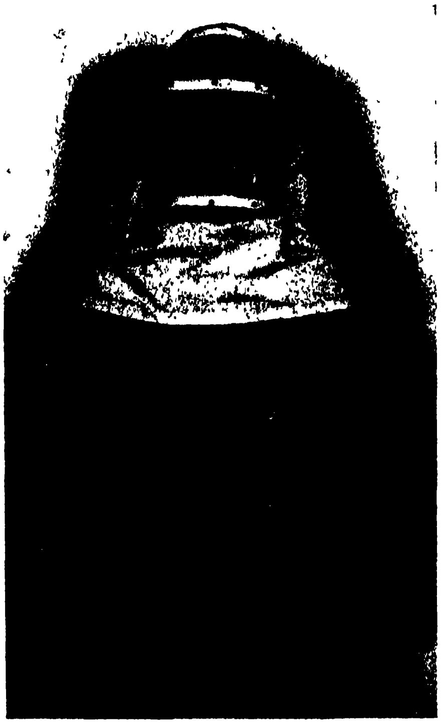
Science News Letter, May 17, 1947

⚙ *ILLUMINATED weather map shows in white and red colors of different intensities areas of high and low pressure. The map, on a translucent surface, is backed by a panel of tiny lamps so arranged that either a single white or red one lights up a separated area. A manually operated keyboard turns on the proper lamp.*

Science News Letter, May 17, 1947

⚙ *DESK EQUIPMENT of an inter-office communication system by which an executive carries on conversations with associates has a radio receiver concealed within it. In use, the intercom automatically cuts off the radio.*

Science News Letter, May 17, 1947



⚙ *FIRE-FIGHTING clothing, developed by the Army for rescue work, has an outer shell of water-repellent cotton duck lined with resin-coated cotton cloth, and an inner lining of fiberglas cloth backed with wool. The window of the helmet, shown in the picture, is a heat-resistant plastic.*

Science News Letter, May 17, 1947

⚙ *DRIP-PROOF faucet, the washer of which can be changed without turning off the water in water mains, has been developed in England. When changing the washer, a special plug replaces the faucet nozzle; then the top of the faucet can be removed without leakage. Double washers in the faucet prevent dripping.*

Science News Letter, May 17, 1947

⚙ *ASBESTOS blankets, for jet-propelled aircraft engines and exhausts, are basically a special asbestos fiber mat shielded with a metallic membrane and enclosed in a wire mesh. They are flexible and easily applied, and can withstand the intense heat of engine cones, turbine casing and tail pipes.*

Science News Letter, May 17, 1947

Question Box

ACOUSTICS

What is the basis of musical experience? p. 310.

What will musicians calculate on a slide-rule? p. 313.

AERONAUTICS

How will runways be lighted for night safety? p. 311.

AGRICULTURE

What medicine fattens hogs quicker on less corn? p. 313.

ARCHITECTURE

What building materials will rival wood for homes? p. 314.

BOTANY

What are the petal numbers that mark the two great divisions of flowering plants? p. 318.

CHEMISTRY

How is a plastic made from common clay? p. 309.

GENERAL SCIENCE

How many Americans have received the James Watt International Medal? p. 307.

MEDICINE

What kind of deafness does a new treatment with histamine help? p. 307.

PHYSICS

How is the wing of a plane used to reduce radio static? p. 312.

PUBLIC HEALTH

Do doctors expect another polio epidemic this summer? p. 312.

Pictures: *Science Service, cover; National Geographic, 307, 309; Army Air Forces, 309; British Information Services, 310; Westinghouse Corp., p. 311; Butler Manufacturing Co., p. 314; Gunnison Homes Inc., p. 315.*

Where published sources are used they are cited.

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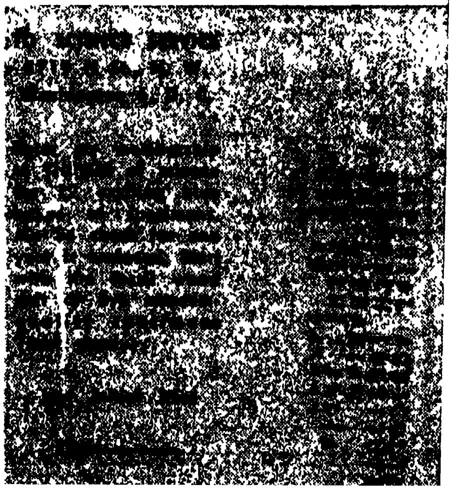

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ENGINEERING

Oil Produced from Shale

To assure the U. S. of an ample supply of liquid fuels, the government has opened a plant for the production of gasoline from oil shale.

➤ SOME 92 billion barrels of oil bedded within America's oil shales will soon begin to take its place in the nation's liquid fuel supply.

A dribble of 1,200 to 2,000 gallons a day will be obtained from the government's new $2,000,000 demonstration plant near Rifle, Colo. This first commercial production in the United States is intended to show what can be done.

Gasoline from oil shales has been produced for several years in various countries. Production from this source has been delayed in America because natural petroleum was plentiful. This plant is one step in the government's program to assure America a plentiful supply of liquid fuels even if natural petroleum deposits are exhausted. Other steps include the production of oil from coal and lignite, and alcohol fuels from farm products, particularly farm wastes.

This government demonstration plant, which is in part experimental, is located on the U. S. Naval oil-shale reserve in a region in which more than half the nation's entire oil shale is found. About 15 gallons per ton of shale is expected. It is estimated that there are 300,000,000 barrels per square mile.

The extraction of oil from oil shale is a relatively simple process. It is costly, however, because the shale must be mined, carted to the plant and crushed before processing. It is put into giant retorts lined with fire-brick where it is heated enough to drive the oil off in vapor form. This vapor is collected, condensed, and then refined much as natural petroleum is processed. Waxes and lubricants are obtained as well as the fuel.

Most oil shales are hard, slate-like rocks with greenish-brown veins of greasy material. Mining at Rifle is relatively easy because much of the shale crops out on mountain slopes, and the mining shafts can be driven horizontally into the mountain sides. In other sections of the country much of the shale is underground and must be brought to the surface by shaft elevators.

In Sweden, oil is being obtained from underground shale by heating the material where found by means of electricity. Electric heaters are lowered into the shale beds through bored holes and, after months of heating, the vapors arise through these and others. The process is reported successful, but it seems to be practical only where electrical energy can be obtained without fuel-consumption, as by waterpower.

In addition to Colorado's oil-shales, there are deposits in Utah, California, Kentucky and Indiana. California's shales yield a true petroleum that can be dissolved out with solvents of the naphtha type. They yield about 20 gallons to the ton. Kentucky-Indiana deposits are underground but near enough to the surface to be recovered by strip-mining. Tests indicate they will yield about 16 gallons per ton of rock.

Science News Letter, May 24, 1947

CHEMISTRY

Using Wasted Iron Oxide

➤ THOUSANDS of tons of valuable iron oxide are wasted each year from steel mills and titanium oxide plants, the American Institute of Chemical Engineers was told by C. C. DeWitt of the Michigan State College. It is dumped into streams where it pollutes the water.

This present waste product is what is called pickle-liquor, an acid solution used to clear the metal of scales and other unwanted impurities. The waste liquor contains a salt of iron in combination with sulfur and oxygen, in what chemists call ferrous sulfate. From this sulfate, iron oxide can be obtained.

For many years a certain amount of this iron salt solution has been converted to copperas, which is the solidified ferrous sulfate, by evaporation and crystallization. From the copperas, iron oxide paint and polishing rouge are made. There are many additional uses, however, for which the recovered oxide can be profitably employed. Its recovery would save a valuable metal, and also save large sums of money now spent by steel mills to make the waste harmless before dumping it into streams. Several states now require that it be treated with a chemical to neutralize its action.

Among uses suggested for the recovered iron oxide is the preparation of metallic iron powder for what is called powder metallurgical uses. In these, powdered metals are pressed into molds and heated to form finished machine parts.

New methods of treating iron oxide make it usable in the "drilling mud" used in boring deep wells in oil fields. This mud is a very thin mixture of clay or other material in the water forced through the center of the drilling shaft to circulate around the biting bit and carry the debris up and out of the hole.

Iron oxide has also now been proved valuable in adding permanent color to cement building blocks. The colors vary from red to blue-gray. The oxide not only adds color but also improves the waterproofing qualities of the blocks. Such blocks never need painting and seldom, if ever, waterproofing.

Science News Letter, May 24, 1947

AERONAUTICS

Jets Combined with Flaps Give Dragon-Fly Agility

➤ JET-PROPELLED airplanes will have the agility of dragon-flies, if a newly patented idea lives up to its promise. It is the work of two Pennsylvania inventors, Charles A. Meyer of Drexel Hill and Donald Bradbury of Prospect Park.

Essence of the new design is the relation between the jet power units, which are embedded in the thickness of the wing, to a pair of hinged flaps on the trailing edge. When these are both directed downward, it gives the plane a big boost in take-off and fast climbing power. When they are directed upward, the plane does a power-dive. With one pair up and the opposite pair down, the plane "turns on a dime". Pinched together, they intensify the effect of the jet; opened wide in opposite directions, they minimize it and act as brakes in stopping.

The inventors have assigned their patent, No. 2,240,323, to the Westinghouse Electric Corporation.

Science News Letter, May 24, 1947

MEDICINE

Treatment Shrinks Cancer

Although no cures have been made, a chemical attack has reduced a cancer from the size of a baby's head to that of a baseball.

Reports from the meeting of the American Association for Cancer Research containing the top news in cancer research, covered by Jane Stafford, Science Service medical writer, follow.

➤ A MEDICAL treatment for cancer and leukemia which made a stomach cancer shrink from the size of a baby's head to the size of a baseball in four weeks was announced at the meeting in Chicago of the American Association for Cancer Research.

The treatment involves a fundamental chemical attack on malignant diseases such as cancer and leukemia. It was originated by Dr. Maurice M. Black, 28-year-old physician and biochemist whose studies were interrupted by Army service which took him to the front in Germany. It is less than a year since he restarted his research at New York Medical College and Brooklyn Cancer Institute.

"No definite cures have been obtained," Dr. Black and his colleague, Dr. Israel S. Kleiner, stated emphatically.

The patient with the stomach cancer was a 70-year-old man who had such severe heart trouble that surgeons refused to risk operating to remove the cancer. He died of the heart trouble before the cancer could be cured, and, in fact, before Drs. Black and Kleiner could know whether the new medical treatment would have cured it.

The other patients treated also have been what doctors call "terminal cases," meaning they were in the last stages of their illness. One leukemia patient was so far gone that doctors would no longer give X-rays or any kind of treatment.

Shrinkage in size of the tumor mass, relief of pain, increase in weight and well-being and definite changes in the tumor as seen under the microscope are the encouraging effects of the treatment observed so far in cancer patients. In leukemia the blood picture and clinical symptoms temporarily improved.

Dr. Black and associates want it known that they do not feel they have yet reached their goal of chemical control of malignant growth, such as cancer. As one of them put it,

"We don't want to sound like charlatans, treating cancer by medicine given by mouth."

The medicines given are sodium fluoride, iodoacetic acid and malonic acid. They were picked because they would inhibit or stop the cycle of reactions by which the cancer cell digests sugars and starches. Cancer cells have long been known to differ from normal cells in these reactions. Many scientists have tried, without decisive results, to check cancer growth by using chemicals to inhibit this sugar-digesting activity. Dr. Black decided to launch his chemical attack at one of three points in the cycle where active phosphate bonds are formed and liberated and where energy for further cell growth is produced.

[illegible]

Unfortunately, the cells can adapt themselves to the blocking chemicals. After sodium fluoride has had its effects, an accessory for phosphate bond formation develops. Dr. Black uses iodoacetic acid to block this. But in time, another accessory is found by the malignant cells, and malonic acid must be used. The cell can even adapt to this chemical, which limits the curative effect on the cancer or leukemia.

By continuing to study the process by which the cell adapts itself to chemical attacks, Dr. Black hopes to reach the goal of chemical control of cancer and leukemia.

Science News Letter, May 24, 1947

MEDICINE

One Bad Burn Can Start Skin Cancer Months Later

➤ ONE BAD BURN, even though it heals promptly with a smooth scar, often is enough to stimulate the development of skin cancer at the burned spot months later.

This is true in the case of mice whose skins have been made highly susceptible to cancer, Dr. William L. Simpson of Barnard Free Skin and Cancer Hospital and Washington University School of Medicine, St. Louis, reported at the meeting in Chicago of the American Association for Cancer Research.

For humans, this finding is important in connection with the century-old question, still wrangled about by doctors and lawyers:

Can a single injury cause cancer?

Opinions on both sides have been based almost entirely on physicians' opinions and "often have been heated by the clash of strong personalities," Dr. Simpson said. "They have been offered freely, while experimental efforts to establish the validity of such opinions have seldom been carried out."

The experiments he reported were made on normal mouse skin and on mouse skin sensitized by treatment with a chemical, 20-methylcholanthrene, dissolved in anhydrous lanolin. This sensitizing treatment leaves the skin structurally and chemically similar to normal skin but with a greatly increased susceptibility to ordinary cancer-causing chemicals.

Three types of injury were inflicted on the mice: 1. burning with a hot glass rod; 2. crushing the skin with pliers; 3. a massive dose of X-rays.

The normal mouse only rarely developed a cancer in result to a single such injury. In the sensitized mice, there was no cancer after the crushing nor after

X-RAYING OIL FIELD—A sample of field rock is mounted in the apparatus where it is injected with oil, gas and water and then X-rayed. This reveals the behavior of fluids in the rock formation. The process is expected to net a greater percentage of oil.

the X-ray burns. But in two groups of the mice burned with the hot glass rod, 42 out of 100 and 65 out of 100 developed cancer several months after the burn had healed. In four-fifths of them, the cancer developed at the spot that had been burned.

Science News Letter, May 24, 1947

MEDICINE

New Anti-Cancer Weapon

Old Indian medicine from May-apple root may be an anti-cancer agent if it is not too toxic to use. It contains podophyllin.

➤ AN OLD INDIAN remedy, podophyllin from mandrake or May-apple root, is science's newest potential anti-cancer weapon. It may prove too poisonous to be useful for treating humans, but laboratory experiments in test tubes and mice show that it can destroy cancers.

The remedy's cancer-killing action in test tube experiments was reported by Drs. Richard A. Ormsbee and Ivor Cornman, of the Sloan-Kettering Institute for Cancer Research, New York, at the meeting in Chicago of the American Association for Cancer Research.

Similar results in mice have been obtained by scientists at the National Cancer Institute in Washington, Dr. M. J. Shear reported.

A laboratory accident like that which led to the discovery of penicillin led the Sloan-Kettering group to their discovery of the possible anti-cancer action that may be locked in the root of the mandrake or May-apple.

Drs. Ormsbee and Cornman had some cancer cells and normal skin cells growing together in test tubes. They would add this or that chemical to these tissue cultures, as scientists call them, to see whether the particular chemical had any different effect on the cancer cells than on the normal cells.

To their surprise, the cancer cells in one of the cultures started dying before anything had been added to the tubes except the nourishing materials. Serum from placental blood obtained when babies are born is among the nutrient materials used. Checking back, they found that the serum in the tubes where the cancer cells died had come from a woman who had been given podophyllin.

She had gotten the remedy as treatment for venereal warts. These warts are not cancerous. They are destroyed by putting a preparation of podophyllin in oil on them. This was discovered by another scientist in 1942.

Drs. Ormsbee and Cornman immediately started testing podophyllin itself and found it would destroy the cancer cells. They do not know what chemical in podophyllin is responsible. Podophyllin itself is simply an alcoholic extract of the mandrake or May-apple root. It is known to contain at least three and probably more different chemicals.

Scientists at the National Cancer Institute started investigating podophyllin because it was known to be a mitotic poison. This means that it stops mitosis, the process by which growing cells divide into new cells. Their hope was that it would destroy cancer by stopping the cell division process of the wildly growing cancer cells. Injecting it into mice that had cancers, they found that it does damage the cancers.

Whether it will also damage normal body tissue and thus prove unsuitable for use is a problem both groups of scientists are now working on. They are also trying to find what the anti-cancer chemical is in the old Indian remedy.

Science News Letter, May 24, 1947

MEDICINE

Cancer from Femininity

➤SUPER - FEMININE mothers may nurse their infant daughters into a dangerously over-feminine state. Breast cancer may result.

Evidence for a relation between breast cancer and over-femininity, in the sense of unopposed action of female hormones, was announced at the meeting in Chicago of the American Association for Cancer Research.

The evidence comes from studies by two University of Minnesota cancer researchers, Drs. Robert A. Huseby and John J. Bittner.

Dr. Bittner a few years ago startled the world by his discovery that breast cancer may result from a virus sucked up in the mother's milk.

The mothers and daughters are mice. But there is increasing evidence from studies of human cancer patients of a relation between male and female hormones and cancer in men and women.

Here is how Dr. Huseby explains it so far as the mice are concerned:

During the last 10 years, three factors have been established as being necessary for the spontaneous development of breast cancer in mice:

1. A genetic (hereditary) susceptibility to the development of breast cancer;

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2. Adequate production and utilization of hormones;

3. The presence of a virus, the milk agent, transmitted from mother to daughter in the milk during nursing.

In the past year Dr. Bittner and Dr. Leo Samuels at the University of Utah have chemically analyzed the hormones secreted by groups of female mice that were alike except for having or not having the milk agent. They found that females with the milk agent had less male hormone than females without the milk agent. (Females, human as well as mouse, produce some male hormones in their bodies.)

"Experiments carried out in other laboratories as well as here," Dr. Huseby stated, "indicate that male hormones inhibit female hormones as far as the development of normal breast tissue and subsequently of breast cancer.

"It is possible therefore that the mechanism by which the milk agent virus influences the development of breast cancer in mice is by reducing the production or changing the metabolism of the male sex hormones produced by the female mice, thus allowing the female hormones to act almost unopposed and breast cancer results.

"Thus the action of this virus may not be directly upon the cells of the mammary gland (breast) but rather only indirectly as it affects the hormone system of the animal.

"This," Dr. Huseby cautioned, "is of course only a theory at the present time and much work must be done to prove or to disprove the correctness of it."

On the human side, scientists listening to him undoubtedly recalled the recent reports of successful treatment of advanced breast cancer in women with male hormone, of breast cancer in men with female hormone, and the earlier reports of success in treating cancer of the prostate in men by castration or by female hormone.

Science News Letter, May 24, 1947

MEDICINE

Drug to Ease Cancer Pain

➤ TO EASE the pain of patients dying of cancer, physicians now have a new drug that is better than morphine for this purpose.

Its name is metopon, short for methyldihydromorphinone hydrochloride. It was developed in the course of a search that started almost 20 years ago for a drug that would relieve pain as morphine does but would not make addicts of persons using it over long periods. The search for the non-addicting morphine was carried on by scientists at the Universities of Virginia and Michigan, the U. S. Public Health Service, the Treasury Department's Bureau of Narcotics and the Massachusetts state health department.

Metopon is derived from morphine. Like morphine, it has both addiction and tolerance qualities. That is, gradually increasing doses are required and it could make addicts out of users of it. But it takes longer for the tolerance and addiction to develop, which gives it advantages over morphine.

It is effective in relieving pain when given by mouth. This means patients will not have to have it injected hypodermically, as morphine must be given for relief of cancer pain. It does not cause nausea and vomiting and mental dullness as morphine often does.

These advantages place metopon "in a class by itself for the treatment of the chronic suffering of cancer," the editor of the *Journal of the American Medical Association* (May 17) states in reporting to physicians generally the availability of the new drug.

The drug will be available only in capsule form and only for cancer patients. It can be obtained only by physicians, only from Sharp and Dohme or Parke, Davis and Co., and only after the official narcotic order form has been approved by the National Research Council, the organization responsible for the new drug's development.

Science News Letter, May 24, 1947

HEALTH

Dust DDT on Grass To Control Dog-Ticks

➤ DDT CAN KEEP dog-ticks under control if dusted on the grass and shrubbery where children and their pets play, state scientists of the U. S. Department of Agriculture. They recommend a powder containing 10% of DDT, applied at the rate of one ounce per thousand square feet. Where more extensive areas are to be covered, a dusting of from two to four pounds per acre is called for, with extra applications along roadsides and paths.

Dog ticks, sometimes called wood ticks, are not merely repulsive but dangerous. They have been convicted of carrying the germ of Rocky Mountain spotted fever, which is a serious disease with a high mortality rate.

The dustings will not completely eradicate the ticks, but will keep their numbers down. It is advisable, during tick season, to go over dogs and children quite carefully every evening, removing all ticks with a pair of tweezers. It is risky to handle the pests with bare fingers.

Science News Letter, May 24, 1947

ENGINEERING

150-Foot Barges Launched With Dynamite by Navy

➤ EXPLODING DYNAMITE on ships is a new way of speeding Navy ship-to-shore operations in an assault on an enemy beach.

The dynamite is used to launch 150-foot barges from the ships. In tests at the Navy's Advanced Base Proving Ground at Davisville, R. I., a pier instead of a ship's deck was used, with dynamite blasts cutting bolts and sliding the barges into the water safely. Another successful method of launching from a ship's deck is to tilt the deck and send the barge over the side on rollers.

The barges are composed of steel pontoons.

Science News Letter, May 24, 1947

PSYCHOLOGY

Don't Expect Babies To Act Like Typewriters

➤ WORKING GIRLS who get married may be disappointed if the baby does not act like a typewriter. Result: psychological problems for the mother, behavior disorders for the child.

Some of the difficulties of 22 office girl mothers, culled from the files of the psychiatric service of the Johns Hopkins Hospital, Baltimore, were reported to the American Psychiatric Association meeting in New York by Dr. Irving L. Berger of Cleveland.

These mothers are used to a fixed routine and the efficient, smooth functioning of office machinery. They expect the same perfection and orderliness of behavior in the baby. Some children rebel. Others give up and become shy and dependent.

But with the second child, Dr. Berger found, the mother usually has a changed attitude.

Science News Letter, May 24, 1947

METEOROLOGY

USSR Helps Our Forecasts

Russian meteorologists cooperate with American scientists in making long-range weather predictions that depend on world conditions.

➤ FULL AND HEARTY cooperation from the Soviet Union is giving Americans better long-range weather forecasts, Chief F. W. Reichelderfer of the U. S. Weather Bureau stated.

The Soviets are actually taking the lead in some stages of weather cooperation with this country, Dr. Reichelderfer revealed. Plans for an exchange of weather experts between the countries were discussed when Dr. Reichelderfer visited Russia in the summer of 1945. Since then, a shortage of trained meteorologists forced the U. S. Weather Bureau to shelve the plans because all available men were needed for work in this country.

Last October, the Soviets brought up the matter. Five Russian weather scientists will soon arrive to begin studies with American meteorologists. Meanwhile the U. S. still lacks enough men to send American weathermen to the U.S.S.R.

The Weather Bureau chief said a five-man party of Americans will not be able to leave for Russia until after a meeting of the International Meteorological Organization next fall.

The IMO is an international organization which the Soviet Union supports actively but it is not a United Nations group. The IMO was founded in 1878 and membership is not based on treaties at present.

Weather Bureau officials explained that the Soviet weather reports are "indispensable" for accurate forecasting. Our weather depends on conditions in the whole northern hemisphere or even the world rather than on conditions within our own boundaries.

Weather data from Russia and Siberia come into the Weather Bureau several times daily. This information has been broadcast on intermediate wave bands by the Russians. It is sent in International Code and picked up by U. S. Navy stations at Manila, P. I., and Guam. The Navy relays the data to Weather Bureau stations on the West Coast; from there, they are sent to Washington.

The information on weather conditions in Russia and Siberia is especially important in long-range forecasting. Any weather forecasts more than two days in advance are termed "long range" by meteorologists.

We send regular weather reports to Russia under a mutual agreement.

Science News Letter, May 24, 1947

CHEMISTRY

Process Saves Rayon Cost

➤ THE DROP from six dollars to sixty cents a pound in the selling price of rayon from 1920 to 1946 was due largely to a method developed by chemists to recover for re-use the great amount of caustic soda used in the process, the American Institute of Chemical Engineers was told in St. Louis.

The process used, technically called dialysis (which in simple language means a type of filtering) was described by H. C. Green, J. H. Koffolt and J. R. Withrow of Ohio State University. In the viscose rayon industry, for every pound of rayon produced approximately one and one-quarter pounds of caustic soda are required.

The recovery of the caustic soda, a chemical known to housewives as lye, is important in preventing stream pollution as well as in saving money for rayon manufacturers and users. At the present time, both it and the soda ash from which it is made are among the world's scarce chemicals, a scarcity that is seriously affecting the production of many needed materials.

The recovery of the caustic soda in the rayon industry is by use of what is called a colloidal membrane, the scientists explained. A colloid is a jelly-like substance, such as glue or starch, but colloidal membranes can be made of many other materials. The material to be recovered is collected from one side of the membrane, and the waste is discharged from the other side.

The fundamental principles involved in the use of colloidal membranes in the separation by diffusion of unlike materials have been known for years and used in laboratories. It has been applied on an extensive commercial scale, using manufactured membranes, only for the past two decades.

Greatly extended uses are promised in the future. It was pointed out by the university men that the first commercial application of dialysis was in the beet sugar industry where the extraction of sugar is accomplished by diffusion through the natural membranes formed by the beet cell walls.

Science News Letter, May 24, 1947

ZOOLOGY

Baby Gray Squirrels Have Urge to Climb

See Front Cover

➤ EVEN THOUGH the baby gray squirrels shown on the cover of this SCIENCE NEWS LETTER are only a few weeks old and their eyes are still closed, they have the urge to climb when placed on the bark of a tree.

As they grow up and venture out into the world on their own, their survival will depend on their agility in climbing and jumping. At the bark of a dog or the glimpse of a hunter they must be able to disappear in a flash by climbing a tree or jumping from limb to limb until they find a safe hiding place.

The photographer, George A. Smith, Quarryville, Pa., gently lifted the baby gray squirrels out of their nest and placed them on the bark of a tree. After the photograph was taken, the furry little creatures were returned to their nest.

Science News Letter, May 24, 1947

PHOTOGRAPHY

Camera for Detectives

➤ A MINIATURE camera for detectives, built to resemble a metal matchbox, is the invention of Joseph Stoiber of Rochester, N. Y., assignor to the Eastman Kodak Company. The lens assembly is sunk into the body of the camera, and its aperture concealed except at times of actual use by a slide. Patent 2,420,628 has been granted this device.

Science News Letter, May 24, 1947

MEDICINE

Chemicals Halt 'Flu Virus

Apple pectin and a mold chemical stop the activity of the influenza virus in mice and may be valuable to humans. They are not toxic.

➤ DISCOVERY of two chemicals that can stop the influenza virus, one of which might become a remedy for the disease, was announced at the meeting in Philadelphia of the Society of American Bacteriologists.

One of the chemicals comes from a mold that lives in the soil. The other is apple pectin.

The mold chemical is called LL 47. The letters stand for the Larchmont Laboratories of Schenley Distillers Corporation, where it was discovered. The number indicates that it was the 47th of more than 300 such substances tested. It was reported by Drs. A. J. Liebmann, D. Perlstein and G. A. Snyder.

Very cautiously, these scientists said that LL 47 stops the activity of influenza virus in mice as well as in developing chick embryos. Tests in human 'flu sufferers were not mentioned and presumably have not yet been made. Large doses can safely be given to mice, showing that it is not a toxic substance and might safely be used if further studies show it likely to be valuable.

The mold this chemical comes from is a member of the large aspergillus family. It is obtained by much the same methods Schenley scientists use for producing penicillin from the penicillium mold.

Unlike penicillin, LL 47 has no action against germs of the bacteria class, such as streptococci and pneumonia germs. But LL 47 acts against a virus, which penicillin does not do. With one possible exception, it is believed the only mold chemical that is effective against a virus. Whether it will prove effective against other viruses is not yet known. The exception is a mold chemical a South American scientist has reported to be effective against the yellow fever virus.

The anti-flu virus activity of apple pectin was reported by Drs. D. W. Woolley and R. H. Green of the Rockefeller Institute, New York. They reported only that apple pectin checks or prevents multiplication of the influenza virus in developing chick eggs.

This finding was made in attempts to determine why the flu virus makes chicken red blood cells clump together. The Rockefeller scientists tested a number of sugar and starch chemicals including apple pectin and flax seed mucilage. These stopped the red-cell clumping by the virus. Then they found apple pectin would stop virus growth in developing chick eggs.

Science News Letter, May 24, 1947

PHOTOGRAPHY

Lab Camera Develops Photo in Thirty Seconds

➤ IN A MILLIONTH of a second a photo is taken. Thirty second later, the finished photo is projected on a screen. A new rapid-action camera combination for taking and developing pictures was announced by General Electric. Used in studying surges of current on electric power lines, it is a non-portable laboratory device, not for amateur use.

The camera has a speed of one-millionth of a second. Used in combination with a cathode ray oscillograph, the camera photographs what appears on a television-like screen when a surge of electricity is applied to the generator and transmitter equipment under test.

As soon as the photograph is taken, the operator pushes a button setting in action automatic developing equipment which completes its job in 24 seconds. Then the film passes into a projector which shows the negative, enlarged ten times, on a ground-glass screen on one side of the camera.

Several quick taking-developing-viewing cameras have been developed. Eastman Kodak Company produced a system by which a person can be photographed and see his picture on a screen 15 seconds later. Polaroid Corporation developed a process adaptable to small cameras by which finished pictures are obtained in one minute.

More recently, a heavy-weight camera, complete with developing and fixing equipment, which takes a pair of pictures at the same time and has them ready one minute later for viewing with a stereoscopic device was announced by the Kannestine Laboratories of Houston, Texas.

Science News Letter, May 24, 1947

SPLIT SECOND PHOTO—This apparatus contains a camera which will take a picture in a millionth of a second and a developer that takes only 25 seconds. A projector throws a picture on the circular screen at the right end.

AERONAUTICS

Alternating Current To Power Airplanes

➤ ELECTRIC CURRENT of the alternating type, the kind used ordinarily in homes, will provide the power in many airplanes of the future. It will replace the generally-used present direct current.

The first practical application of alternating current electrical plants for aircraft was revealed by Westinghouse engineers. Plants of this type are to be installed on two giant Army bombers, the Consolidated B-36 and the Northrup Flying Wing. Experiments with alternating current on planes date back 25 years, but all earlier installations were experimental.

The principal advantages of alternating current in planes are weight-saving, added efficiency, and trouble-free operation, especially at high altitudes. The engineers state that the new installations will give 50% more power per pound of weight than comparable direct current generators. They operate at 208 volts as compared with the 30-volt direct current generators, therefore use smaller wire, saving much weight.

Alternating current permits the use of induction motors. These have no troublesome commutator brushes, the contact plates on their shafts. These brushes wear out very rapidly at high altitudes, causing much trouble. The new generators are essentially the same as ordinary types, the main difference being in size.

Science News Letter, May 24, 1947

ARCHAEOLOGY

Fort Diggings May Solve Mystery of Lost Colony

➤ CLUES in the first great American mystery case, the disappearance of the "lost colonists" from Roanoke Island, North Carolina, have been discovered in excavations on the site of Sir Walter Raleigh's fort, the Department of Interior disclosed.

Diggings at the site of the fort where the English colonists disappeared more than three and one-half centuries ago have revealed the ditch or moat of the fort. Near the bottom of the moat, archaeologists found a hand made brick and a large piece of strap iron. These may be products of the ill-fated settlers who arrived at the island in 1587.

Near the fort, a pit with expertly-fired charcoal sticks has been found. The charcoal might have been prepared for use in heating homes or for a forge or for gunpowder. The fact that the charcoal was abandoned in the pit may indicate that the colonists left their fort hastily.

Under the leadership of Governor John White, the colonists settled on the island in 1587. Governor White returned to England and did not get back to his colony until 1591. The colonists had disappeared and the only clue to what had happened to them was the mysterious inscription, "Croatan", found on a tree or post.

Sir Walter Raleigh, and later colonists at Jamestown, the first permanent English settlement in America, were unable to find traces of the "lost colonists."

Outlines of the fort have been reported as late as 1896, but excavations now underway may dig up more clues to help unravel the historical mystery.

Science News Letter, May 24, 1947

HORTICULTURE

Bailey Medal to Reward Efforts of Young Gardeners

➤ BEST GARDENS raised by American boys and girls this summer will win awards of the new Liberty Hyde Bailey medal, sponsored by the National Garden Institute. This medal replaces the earlier General Douglas MacArthur medal, of which nearly 50,000 have been given to young gardeners during the past two years. Only 6,000 of the new Bailey medals will be struck this year, so that the competition is expected to be especially keen.

The new bronze medal bears the image of Prof. Liberty Hyde Bailey of Cornell University, dean of American horticultural scientists. Now in his ninetieth year, he is still exceedingly active. He spent a few months last winter on an airplane exploration trip in South America, getting home in time to celebrate his eighty-ninth birthday on March 15.

To be eligible for the award, the boy or girl must belong to a group such as a science club, a 4 H club, or a scouting organization, that is supervised by a recognized garden chairman or leader, and turn in a report on his project at the end of the season.

(Detailed information will be supplied on application to Andrew S. Wing, Executive Secretary, National Garden Institute, 598 Madison Avenue, New York 22, N. Y.)

Science News Letter, May 24, 1947

IN SCIEN

NAVIGATION

Flying Lifeboat Promises Value in Life-Saving

➤ A GLIDER that flies and floats gives promise of becoming standard life-saving equipment of the future to rescue the shipwrecked or downed aircraft crews. Hull tests have just been completed in the experimental towing tanks at Stevens Institute of Technology.

As a glider, the 36-foot long lifeboat is towed by a searching plane to the scene of a disaster and released when survivors are spotted. Wings and tail are ejected when it rests upon the water. A small gasoline engine then powers it as a motorboat. Its guide in locating survivors is its mother plane which circles the region, constantly in touch with the lifeboat by two-way radio.

Development of this "flying lifeboat" is a project of the U. S. Coast Guard which expects to use it in rescue work where other methods fail. It was designed by Areoaffiliates, Inc., Tuckahoe, N. Y. One of the major problems was the design of the hull to meet landing requirements and also be seaworthy. The tests indicate these essentials have been met.

Science News Letter, May 24, 1947

NUTRITION

Better Food Utilization Causes Inherited Fatness

➤ INHERITED overweight is the result of more efficient food utilization, Drs. G. E. Dickerson and J. W. Gowen, of Iowa State College, announce in *Science* (May 9). The hereditary factor reduces food requirements per unit of gain and produces "fatties" primarily by increasing the food intake and by reducing the energy expended, especially for activity, they find.

Both of these effects increase the energy available for storage as fat, whereas the first raises only slightly, and the second reduces, the energy dissipated in body work.

The evidence, by the way, came from studies of mice, undertaken to learn more about fattening swine. But it may apply to men and women.

Science News Letter, May 24, 1947

E FIELDS

PSYCHOLOGY

Desire to Be a Martyr Caused by Love Hunger

➤ THE ABNORMAL desire to suffer and be a martyr is not a sign of hatefulness in the sufferer, but shows his need for love, Dr. Bernhard Berliner, of San Francisco, told the American Psychiatric Association in New York.

It is a fundamental aspect of Western culture, he said. Dr. Berliner disagrees with the Freudian psychiatrists who consider that the person who apparently gets pleasure out of his own pain demonstrates an inverted desire to inflict pain.

Every patient of this type, he said, had an unhappy childhood. He does not love pain for itself but because the pain unconsciously represents some loved person who once caused him pain.

Science News Letter, May 24, 1947

CHEMISTRY

New Method More Practical For Producing Methylamines

➤ WHEN the ammonia gas that gives pungent effect to the ordinary household water solution is added, chemically, to wood alcohol, valuable chemicals known as methylamines are formed. Few besides chemists know about them, but they are employed in making many things in daily use.

They are used in de-hairing hides to make leather, vulcanizing rubber, materials to kill germs, explosives, textiles, photographic developers, and druggist preparations.

Wood alcohol is known to chemists as methanol. To form the methylamines, ammonia and methanol vapors are passed over a catalyst. This is one of the many types of materials that promote chemical action without being affected chemically themselves.

One difficulty in making methylamines in the process described, the American Institute of Chemical Engineers was told in St. Louis by R. S. Egly and E. F. Smith, of Commercial Solvents Corporation, is that three different methylamines are formed, one of which has little value as yet. This is known chemically as trimethylamine. They explained how it can be produced in the mixture in lesser amounts. In the past, it has been separated and burned as a waste product.

The treatment suggested has to do with the length of time the vapors are allowed to remain in contact with the catalyst, and a proper choice of temperature and pressure for the reaction. The addition of water suppressed trimethylamine production, and had very little effect on reactions to the other amines.

Science News Letter, May 24, 1947

PHYSICS

Electric Braking to Make New Subway Cars Safer

➤ ELECTRIC BRAKING will promote safety on 200 new cars now under construction for New York subways. It will be used in combination with ordinary air brakes, and the two together will cut stopping-time one third.

This equipment, and all other electrical appliances for these new cars, is under construction by Westinghouse Electrical Corporation. The breaking system, which will include improvements over earlier types, is what is known as electric dynamic braking.

It is a system in which the electric motors that ordinarily drive the cars operate in reverse as generators, driven by the momentum of the car.This action creates a braking effect which is transmitted by the gears to the axles and wheels.

Another improvement in the electrical system of these new cars will be the use of four 100-horsepower motors, one on each axle, instead of two 200 horsepower motors, the usual equipment. While the total power is the same, the new arrangement gives quicker starting pick-up speed because the power is applied directly to each of the four axles, instead of to two only.

In designing the electrical equipment, Westinghouse engineers aimed at both greater riding comfort and increased operating efficiency. A feature that adds particularly to comfort is the spring-suspension of the motors, together with gear assemblies operating on roller bearings.

Ordinarily, motors are mounted directly on the axles. Their weight increases the jar at every place where rails join. These spring-suspended motors, connected by flexible coupling with the gears, cannot pass their vibrations on to the car and passengers.

Science News Letter, May 24, 1947

PHYSICS

Supersonic Laundries To Remove Dirt from Clothes

➤ SUPERSONIC LAUNDRIES may come before planes can fly faster than the speed of sound.

Very high frequency sound waves are being tested as an aid to removing dirt from clothes. Sir Edward Appleton, secretary of the British Department of Scientific and Industrial Research, disclosed that sound waves of such high frequency that they cannot be heard may revolutionize laundering processes.

He explained that dirt is held to a fabric by electrical attraction. Soap and other solutions, called detergents, are now used to break this electrical attraction.

But if current research is successful, sound waves may do part of the job in the future. Supersonic vibrations are being used to shake out the dirt particles from clothes. Sound waves would also emulsify the dirt in the cleaning solution to keep the dirt from getting back on the clothes.

The idea of using sound waves to shake dirt off fabrics was developed from the wartime Asdic submarine detector.

Science News Letter, May 24, 1947

MEDICINE

Dye Used in Photography May Cure Elephantiasis

➤ A DYE USED in photography may turn out to be a cure for one of the tropical diseases most dreaded by our forces stationed in the South Pacific during the war. This was elephantiasis, the repulsive condition sometimes resulting when filariasis, a worm-caused disease, is not treated and becomes chronic.

Cotton rats infested with the worms almost invariably were cured by the dye, Drs. Arnold D. Welch, Lawrence Peters, Ernest Bueding, Arthur Valk, Jr., and Aeme Higashi of Western Reserve School of Medicine in Cleveland report in *Science* (May 9).

The dye they used is known as No. 863 for short. It is one of a number of cyanine dyes which the Western Reserve scientists investigated for the Army and the Office of Scientific Research and Development. Cyanine dyes are indispensable in photography as color sensitizers.

Science News Letter, May 24, 1947

NAVIGATION

Submarines of the Future

Faster submarines will be real underwater boats, making use of the German snorkel that makes it possible for them to stay under water for months.

By A. C. MONAHAN

➤ THE SUBMARINE of tomorrow will be a different kind of steel fish, a true underwater ship. It will be run by atomic power. It will be able to cruise completely submerged for weeks at a time.

The old veteran submarines of the last war—with their proud markings showing enemy ships sunk—are obsolete victims of engineering progress.

From the atomic bomb there will be snatched the power of fission. From the Germans there will be adapted an air-snatching device, the snorkel, and a radically streamlined hull for speed.

These submarines will be able to escape detection and destruction in a future war, even if the enemy uses the smartest anti-submarine methods we developed in the war. Greater range and increased load capacity will be built into them.

American underwater boats of today are subject to the same anti-submarine measures that so effectively cleared the Atlantic during the war of the Nazi U-boat menace. These measures are now known to all nations.

Escaping Detection

An important requisite of an effective submarine is the ability to escape detection, but if detected to escape destruction. This means greater underwater speeds, and the ability to remain deeply hidden in the ocean for months if necessary. The new types now proposed would have these requirements, plus greater range and increased carrying capacity.

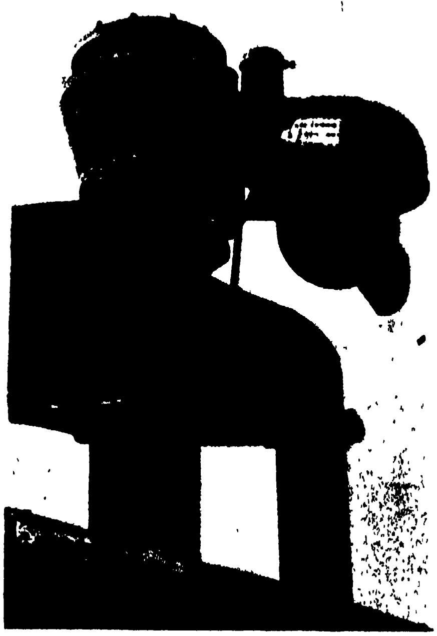
There are some who believe that the submarine as a war weapon was doomed with the advent of the atomic bomb. Naval officers do not agree. However, the atomic bomb turned their eyes toward atomic energy as a type of propulsion power. Its immediate use for this purpose is not to be expected. Scientists have a long road ahead before atomic energy is harnessed for power-plant uses.

"Atomic energy is certainly the perfect answer to submarine propulsion requirements," Vice Admiral Charles A. Lockwood recently stated. "Once worked out it becomes an unlimited power source, and more than that, it would require no oxygen supply for operation. The submarine at present is still chained to contact above the water for air—either by surfacing or the use of long breathing tubes."

Lots of Room Needed

Atomic propulsion plant in a submarine is going to require a lot of room, he added, but another officer states that space now used for fuel storage would be available for war missiles.

The Navy has no intention of waiting for atomic energy before building new submarines. Already plans have been made for underwater craft that will, in part at least, be less easily destroyed by present-known anti-submarine measures. They will be better able to withstand atomic bomb explosions from lessons learned at the Bikini tests last summer, and they will incorporate German U-boat developments made too late in the war to be of much help to the Nazis.



AIR FROM ABOVE—The snorkel on German submarines enables them to stay submerged at least 70 days.

Germany started the war with what was then regarded as advanced types of U-boats, but toward the end of the war had far superior craft in service or bottled up in German waters. For the development of this superior U-boat, Allied anti-submarine measures were largely responsible. Nazi craft in the Atlantic were being detected and sunk at a rate that even Hitler could not stand.

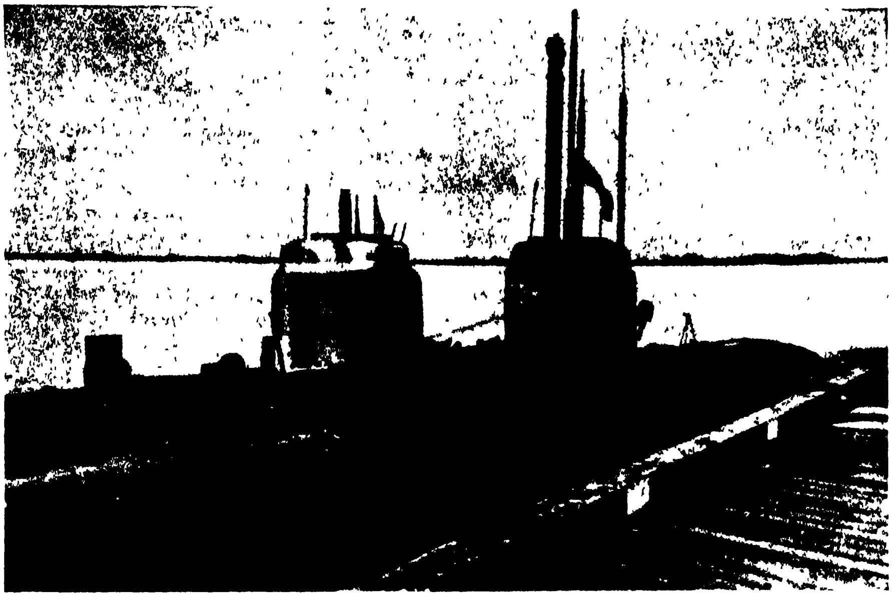
The Germans had reached a point where they faced complete defeat unless something could be done to turn the tide of the battle in the Atlantic. Therefore scientists and engineers were put to work in desperation to overcome the situation by developing U-boats safe against the anti-submarine measures. They were successful, to an extent, and produced submarine accessories and new craft which, if available earlier, might have prolonged the war.

German Snorkel

The German "snorkel" system was one of these important developments. It has a breathing tube that can be used when the submarine is relatively near the surface but still hidden under the water. This tube is raised and lowered like a periscope, and provides fresh air for the ship's diesel engines and for the crew. Vessels with snorkel need not come entirely to the surface to recharge power batteries. In fact, many remained submerged the entire time they were away from their ports, sometimes up to 70 days.

Another important German development was a radically streamlined hull to take full advantage of increased battery capacity, both resulting in higher underwater speed. This increased speed, even though for limited periods, increased the difficulties of submarine detection and destruction. These submarines could catch up with a fast convoy, discharge their torpedoes, and get far away in a short time.

Investigators from America and Brit-



TYPE 21—This German submarine is being studied by the U. S. Navy. The large column is the snorkel.

ain found in Germany, after the war, blueprints for a submarine which was to have even greater submerged speed. Hydrogen-peroxide gas turbine engines would provide propulsion power, at least for limited periods when spurts were needed. It was to have an estimated underwater speed of 24 knots, which is more than present American submarines can make on the surface even at full power.

The U. S. Navy is considering the German developments in submarines, experience gained with our own vessels during the war, and also the question of guarding against anti-submarine measures such as were successfully used against Nazi U-boats. The Navy has two of the German so-called Type 21 submarines in operation for testing and evaluating. During the war our submarines were materially much better built than the Germans', an American officer states, and we had superiority in electronics, sonar and torpedo fire control gear.

Anti-Submarine Measures

Anti-submarine measures that so successfully cleared the Atlantic, and now make new-type underwater craft necessary, include visual detection of surfaced U-boats recharging batteries, or electrical methods involving sound or magnetism by which completely submerged ships were located. The actual "kill" was by shell-fire or depth bombs.

Three of these electrical methods were used. The most successful, according to the Navy, is known as "sonar." Other methods used magnetometers and sono-radio-buoys. Sonar is credited with sinking a majority of the 996 enemy submarines sent to the ocean bed during the war.

Sonar depends upon reflected underwater sound waves. Special equipment is lowered under the keel of the boat to send out sound waves and to receive any reflected back by the hull of a submerged U-boat. Tiny tubes of nickel alloy, with coils of wire around them, form electromagnets which elongate or contract with changes in their electric flux. They send out a "ping" and receive back waves that generate an electric current from the tubes to produce a different sound. Operators can distinguish between reflected sounds from ship propellers and from submarine hulls.

The magnetometer is an air-borne magnetic instrument that in the air is allowed to trail below an airplane. It is sensitive enough to be affected by magnetic material below it, such as the steel body of a submerged U-boat. The same instrument is used in making land surveys for hidden ores.

The sono-radio-buoy is a small floating device which was dropped on the surface from aircraft when U-boats were suspected in a particular vicinity. The buoy contains a submerged hydrophone capable of picking up the underwater sound made by submarine propellers. The hydrophone triggers a tiny radio transmitter in the buoy that sends coded signals to the plane above. Somewhat similar equipment was used to detect submarines trying to sneak underwater into Allied harbors.

Submarines For 47 Years

Submarines have now played a part in the United States Navy for 47 years. It was in April, 1900, that the first was accepted by the Navy. It was the USS Holland, named after the American who built this submersible torpedo boat, as it was then called.

It is a long step from the Holland to the giant submarines used during the war, and to the new larger U-boats that the Navy desires to build. The Holland was 53 feet long, was powered by a 50-horsepower gasoline engine, had a speed of seven knots, a displacement of 75 tons, and only one tube for discharging its three torpedoes.

American World War II submarines, of what is called the modern fleet type, are 310 feet long, have a displacement of 1700 tons, considerable speed, and are each powered by four diesel engines totaling 6,400 horsepower.

The Holland submersible was not the first underwater craft by any means. One was operated in the Thames river near London in 1620, it is claimed. Bushnell's one-man, screw-propeller tiny boat tried to sink a British ship in the Hudson river in 1776. Robert Fulton, of steamboat fame, built the Nautilus in France ten years before he built his steamboat.

None of these or others was taken seriously as war weapons, however. But in 1864, when the USS Housatonic was sunk in Charleston harbor, South Carolina, by an eight-man submarine, the possibilities of underwater craft began to be understood. Since then, almost constant efforts have been made to build better and bigger submarines.

Science News Letter, May 24, 1947

CHEMISTRY

Seaweed Jelly of Alginates

➤ A NEW KIND of seaweed jelly, useful in ice creams, confectionery, icings and the like, is the subject of patent 2,420,308, obtained by John I. Gates of Pasadena. It is a mixture of ammonium or sodium alginate with calcium alginate. Patent rights are assigned to the Kelco Company of San Diego.

Science News Letter, May 24, 1947

CHEMISTRY

Synthetic Bone-Black For Sugar Refining

➤ MELLON Institute scientists have reported the development of a synthetic bone-black which as a granular adsorbent promises to replace natural bone-black in cane-sugar refining. Several years ago scientists concluded that no naturally occurring material could be activated to possess all the advantages of natural bone-black. A synthetic cracked bone which could be carbonized in retorts designed for the manufacture of bone-black seemed to be the answer.

The new synthetic product has as its principal ingredient a synthetic hydroxyapatite which is so similar to natural bone that the X-ray diffraction pattern of the retorted material can not be distinguished from that of natural bone ash. Apatite is a phosphate rock containing calcium, an element plentiful in bone.

A wood-like material, also reported by Mellon Institute scientists, made experimentally from waste wood is as good as the original wood for nailing and sawing. The process, now in pilot-plant stage, involves shredding the wood, then molding the fiber by use of a binder.

Science News Letter, May 24, 1947

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ENGINEERING

New Combustion Engine Has Six-Cycle Basis

➤ AN INTERNAL combustion engine that operates on a six-cycle basis instead of the time-honored four or two cycles is the invention on which Ralph H. Hill of Flint, Mich., has obtained patent 2,420,136. The extra strokes suck in cold air, to cool the cylinder wall and piston head at their hottest surfaces. The number of cycles may be varied according to the thermal state of the engine.

Science News Letter, May 24, 1947

CHEMISTRY

Marihuana-Like Drugs

➤ FOUR PATENTS, 2,419,934 through 2,419,937, have been granted to Prof. Roger Adams, head of the chemistry department at the University of Illinois, on a series of synthetic drugs with marihuana-like action, which he states are useful in treatment of narcotic addiction by withdrawal. A typical compound is prepared by condensing pulegone, a derivative of pennyroyal oil, with one of the higher benzenes in the presence of a phosphorus-containing catalyst.

Science News Letter, May 24, 1947

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Do You Know?

Wartime *poison gas* in Australia is being used to control the rabbit pest.

Backs of pages containing *Braille* letters for the blind are given a coat of shellac to keep the dots firm.

Clothing of white or yellow is less attractive to *mosquitoes* than clothing of black, blue and red, scientists say.

Cowpox in animals is really smallpox in the cow, but the germs do not find such favorable living conditions in the cow as they do in humans.

The use of very fine *glass fibers* in textiles for clothing and blankets is increasing rapidly; glass fibers contain no organic protein and therefore do not cause allergies, such as asthma.

Housewives make extra work for themselves when they wash *greasy* pots and pans with soap instead of scouring them; soap makes grease stick to metal surfaces.

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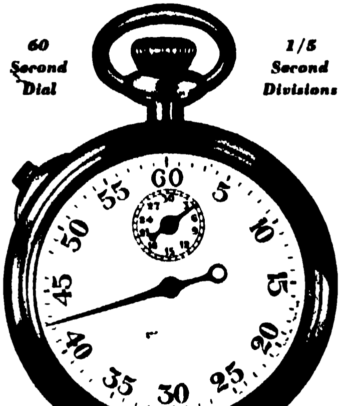

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CHEMISTRY

Plastic from Common Clay

➤ A COMMON CLAY called bentonite is now found usable in making a new plastic. In the process, it is used as a chemical, not merely as a filler. This clay has long been used in molds in foundries and more recently as "mud" in boring deep oil wells with rotary drills.

The research leading to the new use of bentonite was carried out at the Mellon Institute in Pittsburgh where pilot-scale production of one type has been in operation for a year.

In developing the new plastic, bentonite was viewed as an alkali salt of a mineral acid, and advantage was taken of the very small size of the silicate particles contained in it. In the process there is a chemical reaction between bentonite and resin-forming organic polymers, in such manner that the product might be regarded as what chemists call a copolymer of organic resin and the mineral.

Compression molded pieces of the new material show that it absorbs but little water, has high resistance to chemical attack and can withstand high temperatures.

Science News Letter, May 24, 1947

ACOUSTICS

Few Radios Give Sounds With Highest or Lowest Tones

➤ YOUR RADIO is letting you down. When an orchestra plays, you do not hear the highest or lowest notes. Chances are you would like to hear them.

A scientist explained the situation at the Acoustical Society of America meeting in New York. Your ear is capable of hearing sound waves with frequencies from 16 to more than 16,000 cycles. The average home radio has a frequency range from about 75 to 5,000 cycles. Few radios will give you sounds above 10,000 cycles.

One reason for this has been that tests have shown that radio listeners do not want to hear a full frequency range but Dr. Harry F. Olson, director of research for the Radio Corporation of America, says this isn't so.

"Tests involving 1,000 listeners indicated a preponderant preference for the full frequency range," Dr. Olson reported.

Dr. Olson made his tests in a laboratory "living room." A six-piece orchestra played from behind a curtain. Listeners preferred the whole range of frequencies to the limited range of most modern radios.

Science News Letter, May 24, 1947

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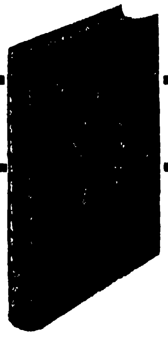

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BOTANY-ETHNOLOGY

NATURE RAMBLINGS

by Frank Thone

Flowers for the Dead

➤ MEMORIAL DAY, or Decoration Day as it is often called, was a kind of natural growth. After the fratricidal strife of 1861-65 there were tragically many raw graves all over the land. Surviving kinsfolk of the valiant young dead men sowed grass and planted shrubs and flowers, as had been the custom for ages.

A custom so universal easily becomes formalized into law. May 30 was fixed upon in northern states as a most suitable date, mainly for the very practical reason the greatest wealth of garden flowers is available in the northern half of our country at that time. Southern states at first did not have the uniformity in observation that prevailed in the North. Some, for the same pragmatic reason that moved their erstwhile antagonists, had their memorial days earlier—spring comes sooner in the South. More chose the birthday of Jefferson Davis, president of the ill-starred Confederacy, which falls on June 3.

But this nation has had three wars since then—three wars in which the descendants of both Blue and Gray wore uniforms of the same color, fought shoulder to shoulder against the same enemies, were laid side by side in the same rows of battlefield graves. Stranger still, they were all given the same name by foreigners, both allies and enemies: "Yankees", or more briefly, "Yanks." It is even probable that when tall young men from Tennessee or Texas gave the Rebel yell as they closed in on an enemy position there were cries of "verdammte Yankees!" So it seems well that those who have died for us, in peace as well as in war, should have a unified day of remembrance.

That part of that remembrance should take the form of flowers is simply part of basic human nature. How far back in time the practice of decorating burial-places with flowers may go there is simply no telling. Certainly it was well developed in the oldest cultures of Egypt and Mesopotamia, which were highly evolved and mature when the record of written history began. It can hardly be doubted that the custom goes beyond that, far back into prehistory.

Flowers are used as burial ornaments not merely because of their consoling beauty but for a reason deeper than that. Because they die in autumn and are buried all winter, yet arise again in spring, they symbolize immortality. In them, we have made visible "the resurrection, and life everlasting."

Science News Letter, May 24, 1947

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METALLURGY

Coke Consumption Cut

➤ COKE CONSUMPTION in blast-furnace operation is cut by blowing in heated carbon monoxide to speed the ore reduction process, in the process on which S. P. Kinney of Crafton, Pa., received patent 2,420,398.

Science News Letter, May 24, 1947

SAFETY

Underground Building Best Defense from Air Attack

➤ THE BEST defense from air attack is underground. That is the verdict of Army Air Forces officials who have been studying Germany's underground aircraft production installations.

The Air Materiel Command said that the Nazis had a total of 143 factories in production underground. Twenty per cent of the German airframe industry, nearly 60% of the aircraft engine and jet production and virtually all of the V-weapon work were underground.

Today, the Germans' installations underground are rusting, due to water seepage. They had other troubles with their underground factories, including noise absorption, gas proofing, dust control and others.

But AAF officials believe that with adequate planning, the underground installations could have protected German industry against any weapon used against the Nazis in World War II.

Science News Letter, May 24, 1947

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THE CHEMISTRY AND TECHNOLOGY OF PLASTICS — Raymond Nauth — *Reinhold*, 522 p., illus., $9.50. A technical book on plastics; divided into sections on thermosetting resins, thermoplastic resins, cellulose plastics, synthetic rubber, natural resins and plywood, and mold design and equipment.

DEVELOPMENTAL PHYSIOLOGY OF THE GRASS SEEDLING II; INHIBITION OF MESOCOTYL ELONGATION IN VARIOUS GRASSES BY RED AND BY VIOLET LIGHT —Robert L. Weintraub and Leonard Price—*Smithsonian Inst.*, Pub. No. 3869, 14 p., paper, 15 cents.

ELECTRONICS FOR YOUNG PEOPLE—Jeanne Bendick—*Whittlesey House*, 175 p., illus., $2. The simple line illustrations make this story of electrons very clear.

FUNDAMENTALS OF NAVAL WARFARE—Lee J. Levert—*Macmillan*, 488 p., $5. Starting with the battle of Salamis in 480 B. C., this author also analyzes modern naval warfare and weapons.

GERMAN RESEARCH IN WORLD WAR II—Col. Leslie E. Simon—*Wiley*, 218 p., illus., $4. An extraordinary analysis of German wartime developments: rocket weapons and jet propulsion; the wind gun, super gun, and sound used as a weapon. The organizational set-up which produced these weapons is discussed, revealing that lack of coordination between civilian and military prevented the full application of the knowledge each possessed.

HOW TO KNOW THE LAND BIRDS—H. E. Jaques—*W. C. Brown*, 196 p., illus., spiral bound $1.50, cloth, $2.50. A carefully thought out key to bird recognition. Grand for field trips, and includes map indicating general habitat of species.

HOW TO RECOGNIZE AND CONTROL TERMITES IN ILLINOIS—B. G. Berger—*Illinois Natural Hist. Survey*, Circular 41, 44 p, illus., paper, free. A discussion of measures to control this wood-destroying insect.

THE LAND AND WILDLIFE—Edward H. Graham—*Oxford Univ. Press*, 232 p., illus., $4. A discussion of good land management as related to wild life conservation also deals with using wastelands to yield furbearers and waterfowl productively and prevention of soil erosion.

LOW-PRESSURE LAMINATING OF PLASTICS—J. C. Hicks, asst. by R. J. Francis—*Reinhold*, 162 p., illus., $4.50. A careful discussion of this phase of plastic work.

THE MASTER HAND; A Study of the Origin and Meaning of Right and Left Sidedness and Its Relation to Personality and Language—Abram Blau—*Am. Orthopsychiatric Assn.*, 206 p., $4.50. Research Monograph No. 5 of the American Orthopsychiatric Association presents a critical survey of the various theories advanced to date.

MODERN PLASTICS ENCYCLOPEDIA, *Plastics Catalogue Corp.*, 11th ed., three vols, 1,556 p., illus., $8.50.—Complete information on plastics. Vol. 1 is a reference to the most recent developments, vol. 2 is devoted to processing, vol. 3 contains 10 special charts to facilitate reference and handling.

PERPETUAL TROUBLE SHOOTER'S MANUAL, VOL. XV, *John F. Rider*, Manual Series, 2000 p., illus., $18. A large manual to solve servicing problems of multi-band receivers; among other features, contains a separate "clarified schematic" diagram for every band of every multi-band set put out by manufacturers in 1946.

PHILOSOPHY; ITS SIGNIFICANCE IN CONTEMPORARY CIVILIZATION—Hirsch Lazaar Silverman—*Bruce Humphries*, 36 p., $2. Written for laymen to help them arrive at a workable philosophy of life.

PRINCIPLES OF RADAR—Staff Members of Mass. Inst. Tech.—*McGraw-Hill*, 2nd ed., 12 chapters, unpaged, illus., $7. For use as a textbook in the Radar School at M I.T, this revised edition brings up to date a book that proved itself in wartime.

THE PSYCHOANALYTIC STUDY OF THE CHILD—*Int. Univs. Press*, Vol. II, 424 p, $7.50. The second volume of this annual has chapters on problems of child development, clinical problems, guidance work, education and sociology and the history of child psychiatry.

RADIO BROADCASTING AND TELEVISION—Oscar Rose, ed.—*Wilson*, 120 p., $1.50. An annotated bibliography of over 1000 items surveying the field of radio from every angle except the technological. Included are programming techniques, content, advertising.

RESEARCH PLANNING MEMORANDUM ON LABOR MOBILITY—Gladys L. Palmer—*Social Science Research Council*, Pamphlet 2, 22 p., 25 cents. The second in a series of groups of topics which represent gaps in existing knowledge, this brochure was prepared for the Committee on Labor Market Research.

SOUR CREAM COOKERY—Barbara Brown—*Barrows*, 250 p., $2.50. A compilation of recipes using sour cream, sour milk, buttermilk and cottage cheese; a help to anyone planning meals to include an adequate amount of dairy products.

TELEVISION TECHNIQUES—Hoyland Bettinger—*Harper*, 237 p., illus., $5. This manual covers problems of equipment, composition of the picture, photography, script-writing, direction of the play and basic principles of production. It will be useful to all engaged in this industry.

THE THORACIC MUSCLES OF THE COCKROACH PERIPLANETA AMERICANA (L)—C. S. Carbonell—*Smithsonian Inst.*, 22 p., illus., paper, 20 cents. Pub. No. 3890. A paper on the internal anatomy of the cockroach to aid those using this insect for experimental work.

Science News Letter, May 24, 1947

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❁ *ANTI-FOGGING agent, for use on eyeglasses, automobile windshields and windows, is a water-clear liquid that is used to dampen the cloth used in cleaning. An invisible film is left on the glass that prevents fog formation for a relatively long time.*

Science News Letter, May 24, 1947

❁ *INK, to mark permanently glass, porcelain, rubber, photographic films and other laboratory materials, requires no heat to fix. Available in four colors, it can be removed while wet with water but, after drying, is resistant to most chemicals and to heat.*

Science News Letter, May 24, 1947

❁ *BROADCASTING truck, in use in the New York metropolitan area, contains a complete broadcasting studio equipment and radio telephone connection with transmitters at a central station. It has four different short wave transmitters, the usual recorders, and a roof platform for reporters.*

Science News Letter, May 24, 1947

❁ *EYE-WASHING fountain is designed for installation in factories where eye-injuring substances in liquid, vapor or dust form are present. It is an aluminum wash-stand, formed to fit over the eyes, equipped with drain and two adjustable water sprays for flushing purposes.*

Science News Letter, May 24, 1947

❁ *WINDOW CLEANER, with a long jointed handle, enables a housewife to wash the outsides of windows while standing erect on the inside. Made of light magnesium, it weighs only 13 ounces, including its reversible cleaning head which has a felt side for washing and a rubber squeegee for wiping.*

Science News Letter, May 24, 1947

❁ *METAL CANS with transparent plastic covers are handy in the household because their contents, from buttons to brads, can be viewed without removing the top. They are made in ten convenient sizes, and have an ornamental finish.*

Science News Letter, May 24, 1947

❁ *MUSIC console for the home, housing both radio and a record player, has a table top over the record player that is raised like an elevator by operating an electric switch. Objects on the elevator need not be removed because the top remains level.*

Science News Letter, May 24, 1947

❁ *STEEL hand stamp, to put individual initials on tools of wood or metal, is made of high-grade tool steel with the desired letters cut into one end. In use, it is placed against the object to be marked and tapped with a hammer.*

Science News Letter, May 24, 1947

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Question Box

CHEMISTRY

What new method is suggested for making methylamines? p. 329.

ENGINEERING

Why is mining oil shales a costly job? p. 322.

MEDICINE

Can a bad burn that heals smoothly start cancer later? p. 323.

For what is an old Indian remedy good? p. 324.

How are medicines given to shrink cancers? p. 323.

How can over-feminine mothers give cancer to their daughters? p. 324.

METEOROLOGY

How does Russian cooperation make possible long-range weather forecasts? p. 326.

NAVIGATION

Why are our submarines out-of-date? p. 330.

NUTRITION

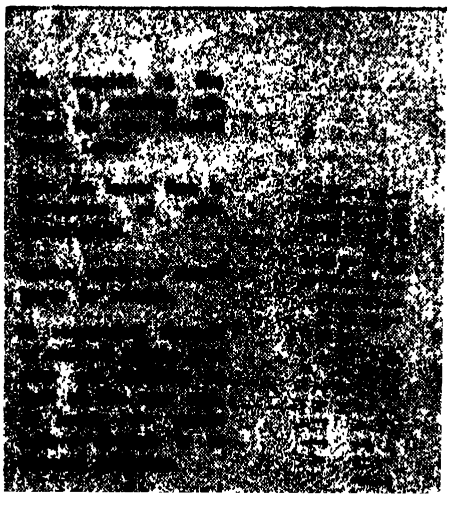
What causes inherited fatness? p. 328.

PSYCHOLOGY

Why do people enjoy being martyrs? p. 329.

Pictures: *George A. Smith, cover; Gulf Research Laboratories, p. 323; General Electric, p. 327; U. S. Navy, p. 330, 331.*

Where published sources are used they are cited.



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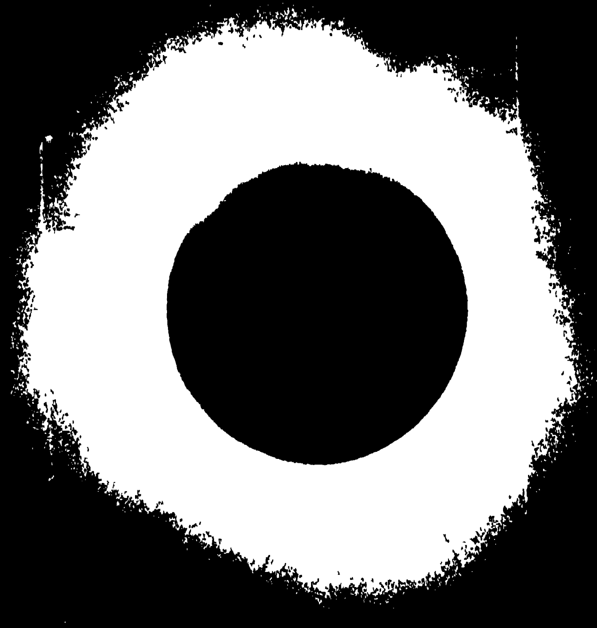


A SCIENCE SERVICE PUBLICATION

PSYCHIATRY

New Shock Treatment

A new kind of electric shock through the brain cures many of mental diseases. The throb of current is very brief and memory is not lost.

➤ MEN AND WOMEN living shut away from reality in a world of diseased fancy, or suffering from the despair of extreme depression are now being restored to mental health by a new kind of electric shock through the brain.

Success with the new treatment for some of the most common types of mental sickness, such as schizophrenia and manic-depressive psychosis, was reported to the American Psychiatric Association independently by Dr. W. T. Liberson, of the Institute of Living, Hartford, Conn., who developed the treatment, and Dr. Douglas Goldman, of Longview State Hospital, Cincinnati.

Secret of the success of the new treatment is that the electricity is regulated so that each throb of the alternating current is extremely brief--only about one half of one thousandth of a second. In the ordinary house current previously used for the electric shock treatment, the pulse of current lasts from eight to 16 thousandths of a second. The new method uses what is believed to be the time that will affect the nerve with the smallest amount of electric power.

Because each throb of the current is so very brief, the treatment can be kept up for a longer time without damage to the brain cells through which it passes.

Both old and new methods produce a convulsion similar in appearance to an epileptic fit. But with the new method, the convulsion lasts longer. It is less severe, Dr. Liberson reported. Patients are able to get up after the treatment and walk out of the room without confusion, walking steadily.

Out of 46 patients who had only this type of treatment, 25 recovered and another four improved.

Chief advantage of this new "brief stimulus" treatment is that it avoids loss of memory or other mental damage, Dr. Librson said. But this is in a way also a disadvantage, for some patients—lacking the complete forgetfulness of the treatment that characterizes those taking the older form of electric shock—develop a vivid antipathy to the therapy. This can be reduced, he explained, by using a sedative drug before the shock.

The new method is especially valuable for old people who need many treatments, Dr. Goldman told the meeting. Dr. Goldman used the new therapy on 125 patients with very favorable results.

Science News Letter, May 31, 1947

PSYCHIATRY

Drug Helps Some Epilepsy

➤ NEW HOPE for children suffering from two serious disabling diseases is offered by the new drug, tridione, Dr. Eugene Davidoff, assistant director of Craig Colony, Sonyea, N. Y., reported to the meeting of the American Psychiatric Association in New York. He has been trying the drug on 75 patients.

Children stumbling about with the clumsy trembling movements often due to injuries to the brain at birth, are quieted down and enabled to move more normally. The drug works for about 65% of these cases known to the doctor as "spastic cerebral palsies of the milder type."

Those with "petit mal epilepsy", in which they lose consciousness very briefly, perhaps falling down and picking themselves up again many times in the same day, are helped in about 60 cases out of 100.

These two diseases which keep thousands of children out of school or tied to a wheel chair have been fairly hopeless in the past.

The new drug is not so successful with the more severe type of "fits" which the doctor calls "grand mal epilepsy." Only 30% of those cases were helped, Dr. Davidoff found.

Reduction in the number of attacks was not always accompanied by an improvement in the pattern of electric signals which doctors can pick up from the brain cells. Only half of the 75 patients had a better brain wave pattern after treatment with tridione, it was found.

In about one case out of five, the drug had some poisonous effects, Dr. Davidoff found. These toxic effects can be kept at a minimum, he said, by careful regulation of the dose and by watching the patient in a clinic or hospital. About 10 or 15 persons out of each hundred cannot tolerate the drug.

Both the toxic effects and the changes in brain wave pattern are aids in estimating the effects of the drug and the type of patient who should be given it.

Science News Letter, May 31, 1947

MEDICINE

Two New Chemicals Keep Chiggers Away Pleasantly

➤ YOU DON'T have to go around smelling of sulfur to keep the chiggers away any more. Two new and pleasanter anti-chigger chemicals are benzyl benzoate and dimethyl phthalate. This latter is the more practical from the standpoint of availability, a husband and wife team of entomologists, Mary H. and Charles D. Michener, report in the current issue of *Natural History.*

Dimethyl phthalate kills chiggers quickly and is found in some of the newer commerical brands of mosquito repellents. You can apply it to your skin, but its effectiveness wears off in four or five hours. For an all day hike through regions likely to abound in chiggers, it is more practical to apply it from the mouth of a small bottle around the tops of boots or socks, waistband, shirt front, cuffs and any other edges of openings in your clothes. This forces the chigger to cross the treated line in order to get inside your clothes and attack you. Still better protection comes from spraying the chemical on your clothes or dipping them into a water emulsion of it. Benzyl benzoate, if you can get it, can be applied in the same way.

Chiggers should not be confused with jiggers or chigoes. These are small fleas which burrow into the skin. Chiggers are mites and they do not burrow. Neither do they suck blood. They inject a digestive fluid into you to dissolve the tissues so they can suck them up. Your skin reacts to this by hardening the cells on all sides of the path of the potent juice. A tubule or sort of miniature well is formed which is often as deep as the chigger is long. The liquefied tissue is contained within the hardened walls. Probably the action of the digestive fluid is what makes the bite itch.

Science News Letter, May 31, 1947

22 JUL 1947

MEDICINE

Test KR for Cancer Here

The Russian anti-cancer endotoxin is being tested in the U. S. on mice. Material for humans is not yet in sight. Results encourage further research.

➤ THE WIDELY heralded Soviet KR cancer endotoxin is being tested in the United States.

All U. S. tests so far are on mice. Any treatment of human patients is "not yet in sight."

Dr. Theodore S. Hauschka, of Lankenau Hospital's Institute for Cancer Research in Philadelphia, reported the first tests to the American Association for Cancer Research.

He told the scientists that the results with mice are sufficiently encouraging to warrant further intensive work on the problem.

He said that every letter he gets from a patient or a physician asking for some of the material will delay still further the day when trials on humans might be made. He works without a secretary. Every time a letter comes, he must stop working on the anti-cancer serum to type the answer.

He works across the street from the hospital, in a house so old that the city of Philadelphia had condemned it. The hospital renovated it for Dr. Hauschka's laboratory, partly to give him more space and partly to safeguard patients and the hospital's mouse colony from the germs of deadly Chagas' disease.

Germs Produce Material

These germs, called Trypanosoma cruzi or T. cruzi for short, produce the anti-cancer material discovered by the Soviet scientists, Dr. Gregory Roskin and his wife, Dr. Nina Klyueva. This anti-cancer material is called an endotoxin. It is neither a serum nor, strictly speaking, a vaccine. It is obtained from the blood plasma of mice that have the germs in their bodies.

The growth of cancers in mice can be slowed and occasionally the cancers can be completely abolished in mice infected with T. cruzi. But since the disease is sometimes fatal to humans, it is not practical to give the germs to the humans. What is given is the endotoxin the germs produce, which is free of all the outer shell of the germs and which does not cause Chagas' disease.

This material produced softening and partial destruction of cancers in Dr. Hauschka's mice, just as the Soviet scientists reported. But the mice themselves died of liver and kidney damage.

This is one reason Dr. Hauschka says "No" to all requests for material to be given to patients. The U. S. material is not yet safe to use.

Second reason why the material is a long way from being ready for trials on human patients is the difficulty of getting enough of it. This is also an important reason why the Soviet scientists were not able to send samples to American scientists for testing.

Made from Blood Plasma

The material has to be made from the blood plasma of infected mice. A mouse does not have very much blood in its body. All the blood you can get from a single mouse makes only one unit of KR anti-cancer material. One of the four patients successfully treated in Russia got 7,750 units over 69 days.

At that rate, there isn't a breeding establishment in the country that could raise enough mice to make material for treating all the cancer patients. And it would take the full time of one technician for every patient to infect the mice, bleed them and process the material. The mice have to be bled at exactly the right stage of the infection. That means injecting the germs into mice every day, keeping a series of them going, so as to have material for treatment every day.

If you wonder how the Russians were able to get material for treating patients, part of the answer is that they have only treated 57 patients and have been working on the method since 1939.

Of these 57, only four have been successfully treated. In these four, three men and a woman, the cancers went away. But it is only about a year (11 months when the report was received in this country) since the first patient was "cured." And as even the layman knows, cancer cannot be called cured until at least five years have elapsed without a return of symptoms.

It takes a special strain of the Chagas' disease germ to produce the anti-cancer material. Dr. Hauschka has been working with several different strains. His latest tests were made with the same one, called the R. strain, the Soviets used.

Miss E. M. Johnson, trypanosome expert of the U. S. National Institute of Health, flew to England last February to get it for Dr. Hauschka from the Wellcome Laboratories of Tropical Medicine. Dr. Cecil A. Hoare there has kept the R. strain going in mice since 1936. It was first cultured 10 years earlier by Dr. Reichenow in Hamburg, Germany.

Science News Letter, May 31, 1947

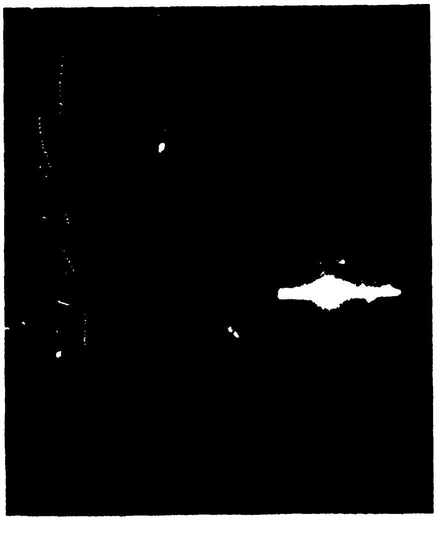
NUCLEAR PHYSICS

Electron Beam Made Visible by Its Own Light

➤ VISIBLE LIGHT is given off from moving electrons in a new atom-smashing machine, and the electron beam has been made visible by its own light, General Electric engineers have revealed.

This is believed to be the first time this effect has been observed, Dr. C. G. Suits, G. E. director of research, states. The observations were made in the 70,000,000-volt synchrotron, a new type of atom smasher built for the U. S. Naval Research Laboratory.

Electrons are electrical particles bearing negative electrical charges. According to the electron theory all matter consists



ELECTRON LIGHT—The spot of light in the center is the radiation directly from the electron beam inside a 70,000,000-volt synchrotron's vacuum tube. The horizontal line of light is caused by reflections and other distortions produced by the glass walls.

of atoms with a positive nucleus, electrically, and a number of negative electrons which may be detached under certain conditions, leaving the atom positively charged. The electron tube, of types similar to those used in radio, emits electrons. The atom-smashers, synchrotron, betatron and cyclotron, emit electrons in powerful beams.

The observations of visible light from the electron beams in the new synchrotron were made by G. E. scientists from behind a protecting concrete wall by means of a mirror. Because of the dangerous X-rays emitted by the atom smasher, it is not possible to approach close to the machine while it is in operation.

They observed inside the doughnut-shaped vacuum tube in which the electrons circle, a brilliant bluish-white spot appear. This is from light beamed forward from the electrons, tangent to their circular orbit.

Emission of light from the electron stream is similar to radiation of radio waves from a transmitting station, Dr. Suits explained. In the antenna, electrons oscillate rapidly to and fro between metal atoms. As they are speeded up and slowed down, their energy is converted into electromagnetic waves.

No electron light was ever observed from the 100,000,000-volt betatron built by General Electric because its doughnut is lined with silver that makes it opaque. The synchrotron, however, is lined with a transparent layer which is electrically conducting like the silver and carries away unwanted electrical charges as they accumulate.

Science News Letter, May 31, 1947

ASTRONOMY

Sun Eclipse Magnificent

The expedition was 80% successful and many plates and films will give scientific information. Large groups of glowing prominences were visible.

See Front Cover

By JAMES STOKLEY

➤ THE GAMBLE made by the Army Air Forces and the National Geographic Society when they sent an elaborate expedition to observe the total eclipse of the sun from a remote spot in the interior of Brazil paid off with nearly complete success.

The expedition was 80% successful, according to the preliminary estimate of Dr. Lyman J. Briggs, former director of the National Bureau of Standards and scientific leader of the party. But many plates and films are still undeveloped and months will be required before they can be fully analyzed.

Aside from scientific value, this eclipse was as magnificent a spectacle as any of the five eclipses I have seen.

During the three minutes and 48 seconds of the total eclipse, I had ample chance to study the solar corona through my binoculars. As predicted by astronomer U. S. Lyons of the U. S. Naval Observatory, there were large groups of prominences or flame-like clouds of glowing gas visible on both the upper and lower edges of the sun.

A full view of the sun, showing the corona at the time of totality, is pictured on the cover of this SCIENCE NEWS LETTER.

Because we were in the tropics, the moon moved across the sun almost vertically from top to bottom. Just after totality commenced, the corona flashed out the brilliant pinkish prominences seen on the lower or eastern edge. The moving moon covered this before totality ended, but exposed the other group above.

I saw one streamer that extended for perhaps twice the sun's diameter to the north. Many shorter streamers appeared, especially curved ones extending from near the sun's poles during totality.

Venus and Mars shone above the sun, Mercury below, Sirius off to the right.

With the eclipse over, both scientists and soldiers made preparations to leave. In a few weeks, cattle of Joao Antonio de Sigueria will be contentedly grazing among concrete piers and brick and cement tent platforms, which the expedition will leave behind. Bocayuvans will have a legend about the strange Americanos who came for such a curious reason, bringing the town prosperity.

Science News Letter, May 31, 1947

Florida's *poinciana* is thought to have come from seed brought by chance from the Old World on a slave ship during colonial days.

PHYSICS

Probe-Like Rod Is Surgical Extractor for Steel Bits

➤ A SURGICAL instrument for the easier extraction of iron and steel fragments from both military and industrial wounds is offered by a Michigan inventor, Raymond A. Mull, for patent 2,420,004. It consists of a probe-like rod, over which an electric coil can be slipped after it has made contact with the fragment. Converted thus into a powerful magnet, it withdraws the fragment from the wound, minimizing the amount of cutting necessary.

Science News Letter, May 31, 1947

Aluminum *bows* for archers are reliable because not affected by weather.

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MEDICINE

Relief for Childbirth Pain

Benzedrine, used for keeping awake, kills pain and stimulates breathing. It increases the pain-killing effect of morphine when used with it.

Reports on the meeting of the Federation of American Societies for Experimental Biology are presented on the following pages and throughout this issue.

➤ NEWEST DRUG being tried for relief of pain in childbirth is the chemical in the "pep pills" college students used to take to keep them awake while cramming for exams.

The chemical is known both as benzedrine and amphetamine. Its successful use for relief of childbirth pains was announced by Drs. Stuart Abel and Stanley C. Harris, Northwestern University Medical School, at the meeting in Chicago of the Federation of American Societies for Experimental Biology.

Benzedrine's pain-relieving ability has not been as widely known as its antisleepiness quality. It not only relieves pain but increases the pain-killing effect of morphine. When both benzedrine and morphine are given, the pain-killing effect is greater than would be expected by adding the separate effects of the two drugs.

Equally important, benzedrine stimulates breathing. These two effects were what led the Northwestern doctors to try it for relief of childbirth pains.

Babies whose mothers got benzedrine with morphine during the first stage of childbirth began to breathe within 42 seconds, on the average, after their chins were out in the air. They cried and had good color and did not need artificial respiration.

Many doctors have favored morphine over all other drugs for relieving childbirth pains, but it had the dangerous disadvantage of slowing the breath in the baby. If the results in the 15 cases reported are duplicated, the combination of the two drugs may come into wide use. The Northwestern scientists are also trying benzedrine for relief of pain in the last stages of cancer and find it successful.

New knowledge of how morphine acts to kill pain comes from rat experiments reported by Dr. Harris and Dr. Frances J. Friend of Northwestern.

Everyone is familar with the fact that when a person is excited, he does not feel pain. This is due to the action of adrenalin, or epinephrine, produced by the adrenal glands in dangerous situations or under conditions of extreme stress and strain.

Morphine, Drs. Harris and Friend discovered, relieves pain by causing the adrenal glands to produce adrenalin.

Science News Letter, May 31, 1947

MEDICINE

Chemical for Leukemia

➤ NEW HOPE for patients threatened with death from leukemia comes from a chemical that turns potatoes black. Eleven patients with acute leukemia, destined to die within a few weeks, have had their lives prolonged by this potato-blackening chemical for months and maybe years.

The chemical, called tyrosinase, is not a cure. It is considered a step forward on the path toward conquest of this cancer-like disease of the blood and blood-forming organs.

Its role in helping leukemia patients was announced by Dr. Raphael Isaacs of Michael Reese Hospital at the meeting in Chicago of the Federation of American Societies for Experimental Biology.

The chemical turns the acute form of leukemia into the chronic form. It is the first substance found that will do this. Most patients with acute leukemia die within six weeks. Patients with chronic leukemia may live for one or two years or more. And there is always the hope that while they are being kept alive by the chemical treatment some permanent cure might be discovered.

The chemical is taken by mouth three times a day. It has a rather unpleasant taste, but Dr. Isaacs hopes it soon will be possible to give it to the patients in capsules which they can swallow without tasting the chemical inside.

This chemical not only darkens potatoes; it plays a part in the production of the black dye, melanin, which is responsible for the dark color in some human skins. Leukemia patients who have been temporarily helped by X-ray or arsenic treatment have their skins turn darker. This suggested to Dr. Isaacs the idea of giving the patients the chemical that causes the change in skin color.

Leukemia patients have too many white cells in their blood. In the acute form, there are too many immature, or young, white cells. In the chronic form of leukemia there are more mature, or ripe, white blood cells. The potato and skin-darkening chemical given to acute leukemia patients cuts down the number of immature white cells in their blood, making them ripen into grown-up white cells. But they still have too many white cells and the fundamental disease is still present. Next step for scientists is to attack the fundamental trouble in the hope of finding a cure.

Science News Letter, May 31, 1947

BIOCHEMISTRY

Drink Coffee Black If You Want Energy

➤ DRINK YOUR coffee black and without sugar if you are taking it to pep up for increased activity. And, in reverse, if coffee makes you jittery, drink it sweetened or eat sweets with it.

These suggestions should work if humans react as rats do to the caffeine of coffee with and without sugar. Caffeine without sugar increased the spontaneous activity of white rats, Drs. John Haldi, Winfrey Winn and Charles Ensor, of Emory University, reported at the meeting in Chicago of the Federation of American Societies for Experimental Biology.

Sugar neutralized the action of the caffeine to a large extent. So did peptone and vegetable oil.

Why this is so the scientists have so far not been able to find out. It is not because of the mere presence of other substances besides caffeine and water in the stomach nor because the other substances interfered with the absorption of the caffeine. Half an hour after the caffeine was given, and after it had been absorbed and produced the increase in activity, sugar neutralized the effect.

Science News Letter, May 31, 1947

MEDICINE

Deadly Chain Reaction

Spreading of disease is a chain reaction as dangerous as that which makes the atomic bomb and can be used as a weapon.

➤ A DEADLY CHAIN reaction as dangerous as that which makes the atom bomb was dramatized in the unofficial Smyth report on germ warfare released by the American Association of Scientific Workers at the meeting of the Federation of American Societies for Experimental Biology in Chicago.

This chain reaction is what makes it so hard to stop an epidemic of flu or measles or any other disease caught from germs in the air. The chain reaction means that an enemy would not need a very large quantity of germs to cause great havoc.

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Science News Letter, May 31, 1947

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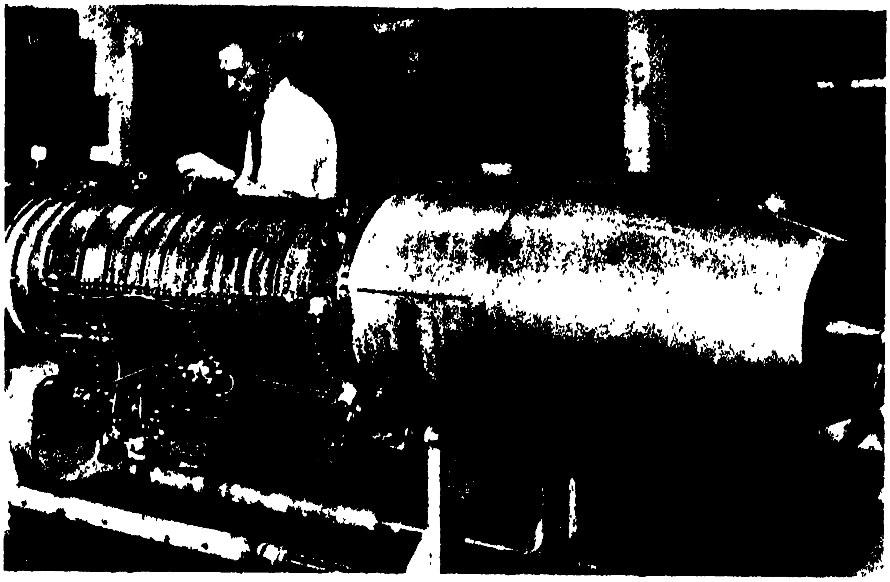

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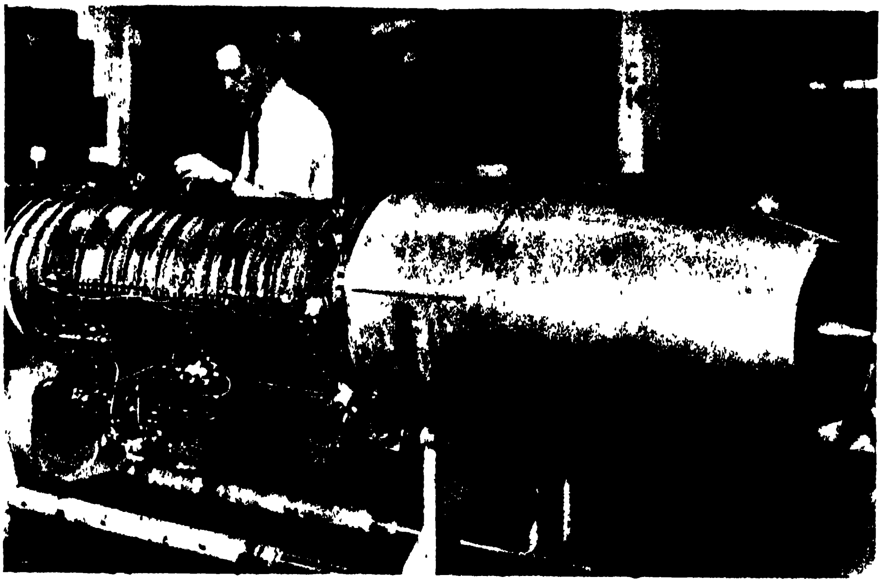

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PSYCHOLOGY

Pill Three Times a Day Makes Children Brighter

➤ NOW A CHILD can take a pill three times a day and grow more intelligent. But if he takes an overdose he will lose sleep.

The pill is glutamic acid, a common chemical that you can buy at the corner drug store if you have a prescription. It is one of the amino acids which are the building blocks of proteins such as you get from meat.

In an experiment, 30 children were given the acid. After a year of treatment they had gained up to 17 points in intelligence quotient and their mental age had gone up two years.

The improvement affects not only intelligence but personality, the meeting in New York of the American Psychiatric Association learned from the experimenters, Dr. Frederic T. Zimmerman, Miss Bessie B. Burgemeister and Dr. Tracy J. Putnam of Columbia University. The children got along better with others after the treatment.

If a child is not bright even after he has taken the acid for a year he might just as well give it up anyway. The greatest improvement, the researchers found, takes place in the first six months. By the end of a year the ceiling of improvement seems to be reached.

Only one of the 30 patients treated failed to get brighter. At the beginning 21 were mentally backward.

Science News Letter, May 31, 1947

MEDICINE

Pinch of Soda Is Good for Athletes

➤ A PINCH of bicarbonate of soda may some day be used to improve the performance of athletes and others engaged in tasks requiring physical exercise.

This possibility has been brought to light by research at the University of California, where Dr. William E. Berg has developed a new technique of measuring physical fitness. The technique may also be useful in studying and diagnosing circulatory diseases.

It is based on the physiological reactions in exercise. During exercise the body consumes an increased amount of oxygen, and as a result builds up a surplus of carbon dioxide as a waste product.

Dr. Berg found that the rate at which the body can rid itself of this waste carbon dioxide is an indicator of physical fitness and of the efficiency of the circulatory system. Age is another factor. A man of 20 rids himself of excess carbon dioxide twice as fast as a man of 60.

In his experiments Dr. Berg found that bicarbonate of soda can increase the rate of elimination of carbon dioxide from the body. He said that this work is only in the preliminary stage, however, and that considerable research must be done before the correct amounts of bicarbonate of soda can be determined. Too much bicarbonate of soda can make a person ill.

Dr. Berg adapted the thermal conductivity analyzer, used in industrial analyses of gases, to the measurement of carbon dioxide eliminated and oxygen consumed during and after exercise.

A subject breathes into a mask while taking stepping-up exercises. A tube leading from the mask carries samples of air to the thermal conductivity analyzer where both oxygen consumed and carbon dioxide exhaled are measured.

Science News Letter, May 31, 1947

NUTRITION

Good Diet Helps Increase Pneumonia Susceptibility

➤ THE ANSWER to why robust, healthy men often get pneumonia may come from discovery of a new relation between diet and disease announced at the meeting in Chicago of the Federation of American Societies for Experimental Biology.

A good diet contains a substance which actually makes mice more susceptible to pneumonia, Drs. George A. Hitchings and Elvira A. Falco, of the Wellcome Research Laboratories at Tuckahoe, N. Y., reported.

A person who eats a good diet that builds up his own resistance may also be taking into his body something which nourishes the pneumonia germs even more than it nourishes him, is a possible explanation of the new finding.

The pneumonia-nourishing substance has not yet been identified. It is found in peanuts, navy beans, oats and wheat. It is present in both the bran and germ of wheat but there is not very much in white flour. It could not be found in liver or yeast, which are rich sources of B vitamins, nor in corn meal or milk powder.

Since the findings were on mice and pneumonia germs only, scientists are not yet ready to advise humans to apply the finding to their own diets.

Science News Letter, May 31, 1947

IN SCIEN

MEDICINE

Cancer-Causing Virus In Milk Believed Isolated

➤ THE ACTUAL chemical in mother's milk that causes breast cancer in mice has been isolated, it appears from an announcement at the meeting in Chicago of the American Association for Cancer Research.

The announcement was cautiously worded but the studies are said to "provide substantial hope that the virus has been isolated."

The work was done by Drs. Samuel Graff, biochemist, C. D. Haagensen, surgeon, Dan H. Moore, physicist, and Henry T. Randall, surgeon, of Columbia University and Dr. Wendell M. Stanley, Rockefeller Institute virus researcher and Nobel Prize winner.

"Certified" mouse milk from a mouse dairy atop a New York skyscraper was treated by the modern tools with which chemists take protein molecules apart to get the cancer-causing agent.

Science News Letter, May 31, 1947

ORNITHOLOGY

Bluejays Getting Used To Their Human Neighbors

➤ BLUEJAYS have apparently decided that since they can't scold human beings off the premises they might as well settle down and be neighborly. At any rate, these big, bold, strikingly-marked birds, once exceedingly man-shy, have during the past half-century or so taken to staying in the neighborhood of houses, even fearlessly coming up to the doors. This change in bluejay habits is noted in a study by Dr. W. M. Tyler in a new publication of the Smithsonian Institution, one of a series on bird life histories.

Although most people who have heard bluejays "sound off" would be hard to convince, these usually raucously noisy birds can also sing. They seem to be quite shy about it, like "tough guys" indulging in lyric poetry. But once in a while a jay will seek the seclusion of the woods, or hide in a thick evergreen, and pour forth a solo of "faint whistles and low, sweet notes, some in phrasing and pitch suggesting a robin's song."

Science News Letter, May 31, 1947

E FIELDS

INVENTION

Electric Stall Kills Mice And Throws Them Out

➤ IF THERE is any truth in that old saying about better mouse-traps, the world should presently be beating a path to the door of H. L. Ratchford of Muncie, Ind., to get his electric one. It is a kind of miniature stall, with metallic contact plates on its floor and sides, a bait-holder at the end, and a cable to plug into the house circuit. When the mouse seeks the bait he comes in contact with the plates and is electrocuted. The last convulsive jerk of his muscles throws him out of the trap, leaving it ready for the next mouse. Patent 2,420,723 has been granted on this invention.

Science News Letter, May 31, 1947

CHEMISTRY

Neutron Bombardment Gives New Isotope of Hafnium

➤ NEUTRON bombardment of hafnium has produced a new isotope of that element, according to Dr. A. H. W. Aten, Jr., of Eindhoven, the Netherlands.

The creation of this new form of matter was originally published by the author in a Dutch language journal during the recent war, and he now has reported his discovery to *Science* (April 11).

The artificially created radioactive hafnium isotope, announced by Dr. Aten, has atomic weight 175 and a half-life period of 10 minutes. It is found in hafnium material which has been irradiated with fast neutrons, and the author suggests its use in analyzing minerals containing both hafnium and its related element, zirconium, to measure the hafnium present.

Fast neutron bombardment produces in addition material with radioactivity measured in periods of six hours, and another kind measured at 20 seconds. The 20-second kind has been reported also by Dr. A. Flammersfeld in a German journal, according to Dr. Aten, but it is made by a different process. Slow neutrons produce this 20-second isomer exclusively.

Hafnium of weight 175 fills a gap in the list of isotopes of that element, whose previously known and stable forms have weights of 174, 176, 177, 178, 179 and 180.

Neutron bombardment is a method being widely investigated by scientists for production of new isotopes of the elements. Each isotope has its own period and type of radioactive decay, so that it has distinct individuality. Hafnium belongs to the group of elements intermediate in weight between the heavy ones like uranium, in which neutron bombardment may produce fission, and the light ones like hydrogen and helium, whose atomic disintegration sustains the heat of the sun and stars. Its middle-of-the-road position is assurance that there is no immediate danger of hafnium bombs.

Science News Letter, May 31, 1947

PHYSICS

Umpire Cuts Off Remarks By Raising Right Foot

➤ "YEROUT!" will resound into the farthest bleachers, in the umpire's own tones of doom.

And if the enraged batter turns round and blares "WHAAT?!!" into the umpire's face-mask, the stands may hear that, too. But delicate ears will be spared the subsequent colloquy, if the umpire raises his right foot. Not necessarily for the immediate physical disciplining of the protesting player, but merely to break his circuit that ends up in the ballpark's loudspeakers.

This situation can be expected to become commonplace if an invention on which U. S. patent 2,420,461 has been granted to Charles H. Capp of Philadelphia finds its way into general use.

The design calls for a small microphone to be mounted inside the mask, right in front of the official's mouth. A pair of wires runs under his clothing and down one pants leg, to a pair of stud-like terminals held in place under the arch of his foot by a harness around his instep and heel. In the normal position for his right foot, behind the plate, is a sunken block containing contacts for his foot-borne terminals. A cable leads back to the amplifying system.

So long as he stands in his usual place, peering over the catcher's head, the stands hear 'em as he calls 'em. If for any reason he steps off his contact-block, his voice loses its Doomsday thunder.

Science News Letter, May 31, 1947

AERONAUTICS

Inventors Attack Problem Of Easier Helicopter Flying

➤ MAKING HELICOPTERS easier to fly is engaging the attention of numerous engineers and inventors. The problem is tackled in three quite different ways by three men to whom patents have been issued by the U. S. Patent Office.

The design on which A. E. Larsen of Jenkinstown, Pa., obtained patent 2,420,784 calls for either one or two small horizontal propellers as part of his craft's tail assembly, to maintain horizontal stability. Beneath them are grilles containing adjustable vanes like the slats of a Venetian blind. These are to overcome the torque effect, or the tendency of the helicopter's body to slew around in a direction opposite to that of the rotor. His patent is assigned to the Glenn L. Martin Company.

R. R. Hays of Lawrence, Kans., tackles the torque problem partly by having a smaller, counter-rotating rotor with trailing flaps mounted directly beneath the main rotor, partly by surfaces set at an angle on the tail rudder. The former functions during the beginning of flight, the latter after the machine has picked up speed. The patent number is 2,420,823.

W. L. Raschke of Fort Worth, Texas, has taken out patent 2,420,796 on a craft with two oppositely turning rotors on laterally projecting booms. These can be tilted to increase speed in forward flight, and the booms themselves can be shifted forward for climbing or backward for nosing downward.

Science News Letter, May 31, 1947

CHEMISTRY

Benzol Used to Toughen Rubber from Goldenrod

➤ THE END of the war has brought a slackening of interest in goldenrod rubber; but we may have to face a rubber crisis again some day, so F. L. McKennon of New Orleans and J. R. Lindquist of Los Angeles have developed a method for toughening up the soft, tacky rubber of this plant. The rubber and the customary compounding vulcanizing chemicals are mixed after dissolving in benzol; then the benzol is rapidly evaporated out and the rubber mixture heated. Rights in the patent, No. 2,420,788, are assigned royalty-free to the government.

Science News Letter, May 31, 1947

ASTRONOMY

Jupiter Brightest Planet

In the southern part of the sky, Jupiter will be the brightest object in the heavens except the moon. Saturn and Mercury will be visible.

By JAMES STOKLEY

➤ STANDING in the south in the constellation of Libra, the scales, the planet Jupiter is the brightest object (except the moon, of course) to be seen on June evenings. With magnitude minus two on the astronomer's scale of brilliance, it is about 19 times as bright as the two first magnitude stars nearby—Spica, in Virgo, the virgin, to the right, and Antares, in Scorpio, the scorpion, to the left. Still higher, in Bootes, the bear-driver, is Arcturus, more brilliant, but Jupiter exceeds this by about eight times.

The positions of these stars, and the planets, are shown on the accompanying maps, which display the skies as they appear about 11:00 p. m., your own brand of daylight saving time, or 10:00 p. m., by standard time, at the first of the month. They have a similar appearance an hour earlier in the middle of June.

Saturn Can Be Seen

Besides Jupiter, Saturn can also be seen, another member of the sun's family of planets which shines, unlike the stars, by reflected sunlight. In brightness between Arcturus and Spica, it is in the west in the constellation of Cancer, the crab, a group between Leo, the Lion, and Gemini, the twins. Saturn sets about three hours after the sun.

In the middle of the month Mercury, innermost planet, is a little to the south of Castor and Pollux, in Gemini, which are shown on the maps in the northwest. On the 17th, Mercury, farthest east of the sun, sets the longest time after sunset. Even then, however, it goes down before twilight is ended. Its magnitude is about the same as that of Saturn, but it will not look as bright on account of its low altitude.

In addition to those already mentioned, several first magnitude stars are also visible. Brightest is Vega, in Lyra, the lyre, high in the east. Below this group we see Cygnus, the swan, with the star Deneb marking the bird's tail. To the right of Cygnus is a small faint constellation, Sagitta, the arrow, and to the right of that is Aquila, the eagle, with first magnitude Altair. Still another star of this rating finds a place on the maps—Capella, in Auriga, the charioteer, close to the northern horizon. Like Mercury, its lowness makes it look very dim.

Two additional planets, completing the list of the five that are visible without optical aid, appear in the morning skies Mars, still quite faint because of its distance, is in Aries, the ram and rises a couple of hours before the sun. Venus, much brighter, exceeding even Jupiter, is in Taurus, the bull, and appears low in the east at sunrise.

Partial Lunar Eclipse

On May 20, as the moon came between the sun and earth, the passage of the lunar shadow across our planet produced a total solar eclipse, visible in Brazil and Africa. About two weeks later, on June 3, the moon has swung around to the opposite direction from the earth and is still close enough to the plane in which the earth goes around the sun to enter partly into our shadow. Thus, there is a partial lunar eclipse, not visible from North America, but visible generally in the eastern hemisphere. It is not a very good eclipse, for at its greatest, the earth's shadow covers only a little more than two per cent of the moon's diameter, which will produce a little darkening on the satellite's northern edge.

In June we see best all that is visible in these latitudes of Centaurus, the centaur. It is shown near the horizon, directly south. In this constellation is the star that is nearest to our solar system—alpha Centauri. Not for thousands of years will this be visible from as far north as New York or Chicago. Now, if you want to see it, you have to go south of latitude 30 degrees north. Thus, this month, it is visible to people in southern Florida. Alpha Centauri's distance is 4.3 light years, which means that its light, traveling 186,000 miles every second, takes 4.3 years to get to us. Alpha Centauri is a system composed of several bodies—actually the one that is closest, called Proxima Centauri, is not the one that is visible from appropriate latitudes, since it cannot be seen with the naked eye.

Close to this star is the Southern Cross, and it is visible from the same latitudes. In fact, the cross was originally part of the Centaur, marking his hind legs, but years ago it was made into a separate constellation. Though it contains brighter stars, it is not nearly as perfect a cross as our "Northern Cross," which forms part of Cygnus, with Deneb at the top of the cross.

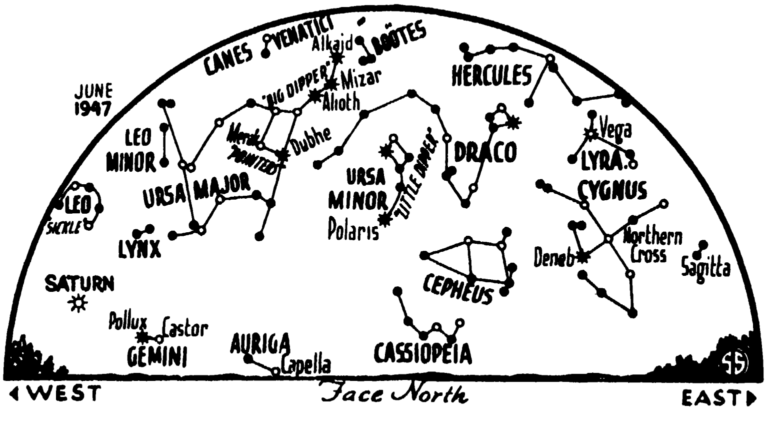
Celestial Time Table for June

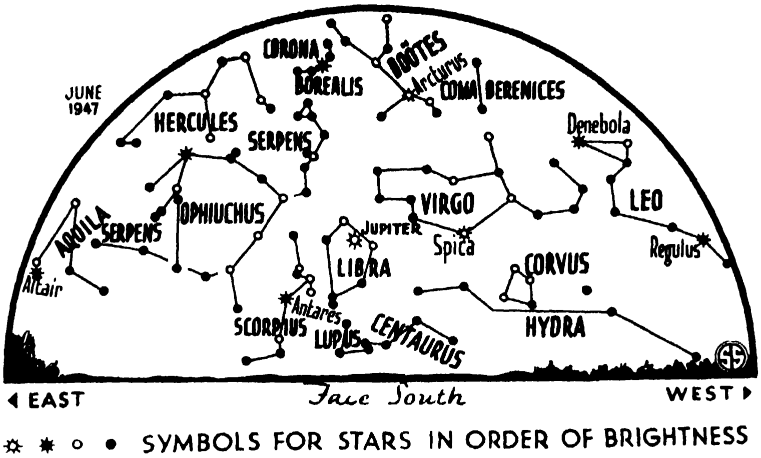
June	EST	
1	7:05 p.m	Moon passes very close to Jupiter
3	2 27 p m	Full moon — partial eclipse of moon visible from eastern hemisphere
6	4.00 p m	Moon farthest — distance 252,200 miles
11	5 58 p.m	Moon in last quarter
16	3·26 a m	Moon passes Mars
17	4·40 a m.	Moon passes Saturn
	6 00 a.m.	Mercury farthest east of sun
18	4 26 p.m.	New moon
19	9 00 a.m	Moon nearest, 222,500 miles
21	6 28 a.m	Moon passes Saturn
22	1 19 a m.	Sun farthest north, summer commences
25	7:25 a.m.	Moon in first quarter
28	8:11 p.m.	Moon passes close to Jupiter

Subtract one hour for CST, two hours for MST, and three for PST.

Add one hour for the corresponding Daylight Saving Time.

Science News Letter, May 31, 1947





AERONAUTICS

English At All Airports

American pilots will be able to speak English with all airports if they do not know the country's language. French and Spanish will be secondary language here.

➤ AMERICAN pilots can converse in English by radio with any airport in the world, the International Scientific Radio Union and the Institute of Radio Engineers were told by Howard K. Morgan, Bendix Aviation Corporation, Baltimore. Those of us who speak English are in a very fortunate position, he said.

This is due to recent international agreements. With airports in non-English speaking countries, their own language is primary but English is designated as a secondary language for use with approaching pilots who can not talk the local tongue. In English speaking countries, French or Spanish is the secondary language, depending upon in what part of the world the country is located.

Voice instructions by radio from airports in countries whose local language means nothing to pilots from other parts of the world presented a serious problem in traffic control in international flying. It was just one of the many problems, however. Others include use of similar instruments in traveling and particularly in making landings in bad weather.

Many hundreds of air navigation and traffic control devices have been developed, Mr. Morgan stated. A number of these were selected at the recent Montreal meeting of the Provisional International Civil Aviation Organization (PICAO) as most desirable. Some of these were described by him.

There is universal agreement, he said, that very high frequency (VHF) radio telephone is the primary aid in the airport zone, and in the enroute-short-distance zone. Bartow lights, of great brilliancy, and fog-dispersal equipment are generally agreed upon as necessary aids in foggy weather. The latter is a method of lifting fogs by means of long lines of burning fuel stretching along runways.

The instrument landing system developed in the United States prior to the war, and improved later, has met with international agreement. This is the so-called three-element system installed at various American airports by the Civil Areonautics Administration It has a radiowave localizer to guide planes to the runway, a glide path for proper rate of descent, and radio fan markers on the approach path to indicate distances from the landing strip.

Scanning radar at all ports to detect approaching planes in overcast weather is a necessity for the traffic control operator, he declared. It should be separated from the radar ground control approach apparatus, known as GCA, and mounted at a more advantageous position. Thus GCA would be used for the precision functions during final approach and landing. GCA is the system by which pilots are "talked down" by radio instructions by ground operators following the plane on radar scopes.

Science News Letter, May 31, 1947

MEDICINE

Needling Cures Sprained Ankles Without Taping

➤ SPRAINED ANKLES, knees, wrists and thumbs can be cured by simply needling the joint. No drugs, taping or bandaging are required.

This finding, which confirms a 2000-year-old Chinese treatment for relief of pain in sprains, was announced by Janet Travell and Audrie L. Bobb of Cornell Medical College at the meeting in Chicago of the Federation of American Societies for Experimental Biology.

Injection of a local anesthetic, novocaine, into the painful joint has become the modern treatment for sprained ankles, wrists, and the like. But in four out of six cases of acute sprains, the Cornell scientists gave the patients complete and permanent relief of pain and disability by injecting a salt solution. In one case "dry needling" alone, that is, injecting the needle but no solution, gave relief.

This dispels the idea that the pain-killing effect of the local anesthetic was what produced the cures of sprained ankles, but leaves scientists with something of a puzzle.

Likeliest explanation, the Cornell scientists say, is that the persistent pain following a sprain is due to pressure by fluid which accumulates within the ligament structures. The pressure is mechanically released when the needle punctures deposits of fluid within the injured tissues.

Science News Letter, May 31, 1947

INVENTION

Vitamin Adding Machine Shows Number of Units

➤ AN ADDING machine for vitamins is the subject of patent 2,420,762, taken out by G. W. Torrence of Peoria, Ill. It consists of a series of superimposed disks turning on a common axis, with names of foods and numerical values for their vitamins opposite them. When you have turned the dials to line up an appetizing meal, you can read off at once the number of vitamin units you'll get.

Science News Letter, May 31, 1947

Do You Know?

Garden *mulch* is best applied after the soil is thoroughly warmed.

One pair of *silk* stockings may require as much as 50 miles of fine filament silk.

Modern *match* heads contain ingredients which rats and mice will not touch, even when starving.

Mules like *bananas* so much that nosebags are used on the animals when working around the fruit.

Volcanic *ash* in Oklahoma has been successfully used to make a light-weight building material suitable for insulation.

The 169 national *parks* and *monuments* in the United States include within their outer boundaries some 600,000 acres in state or private ownership over which the government has no control.

Cigar ashes contain lime, potash, and small quantities of phosphorus, manganese, magnesium and other valuable plant foods; they are a well balanced fertilizer except for the lack of nitrogen.

The importance of *chemistry* in modern life is evidenced by the fact that some 52,000 chemists, chemical engineers and others interested in this subject are now enrolled in the American Chemical Society.

In pasteurizing *milk*, a process now generally practiced which took the name from the noted Pasteur, the temperature is held at 143 degrees Fahrenheit for 30 minutes, or at 160 degrees for 15 seconds, then rapidly cooled.

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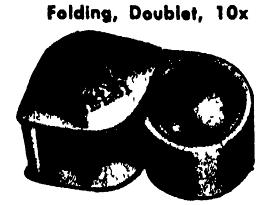

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OPHTHALMOLOGY-PSYCHIATRY

Nervousness Harms Eyes

Prolonged disturbances due to unstable nervous systems may cause blurring of vision and permanent damage to retina. Symptoms are listed.

➤ PERMANENT damage to the eyes, in the form of blurring of vision and a tiny hole at the center of the retina, can be caused by prolonged psychological disturbances.

This is reported by Dr. David O. Harrington, University of California Medical School ophthalmologist, in the *American Journal of Ophthalmology*.

Both this type of permanent injury and similar temporary conditions are caused in young persons with inherited unstable sympathetic nervous systems, Dr. Harrington said. Such cases turned up in great numbers in both services during the war, and they are also to be found in young civilians of unstable temperament.

The psychologically induced ocular changes are caused by the action of emotional disturbances in causing a severe involuntary contraction of blood vessels in various parts of the body. In persons with weak autonomic nervous systems this contraction may cause marked changes in the retina or sensitive nerve layer at the back of the eye. If the disturbance is shortlived these retinal changes may be only temporary, but if it lasts for any length of time the damage may be permanent, Dr. Harrington said.

The same ocular damage may be caused in persons with over-sensitive nervous systems by any stimuli such as exposure to extremes of temperature, too much cigarette smoking, infection, severe pain, dehydration induced by prolonged periods of strenuous muscular exertion, and fatigue approaching exhaustion. ◆

Headache, transient dizziness, blurring of vision lasting from a few seconds to 10 minutes and varying from a slight "film" over the eyes to complete "blackout" are symptoms of the temporary condition.

Dr. Harrington described the typical subject of such attacks as young, underweight, nervous, poor sleeper, frequently a chain smoker, and often a sufferer of true anxiety neurosis. He often has cold, wet, clammy hands and feet regardless of climatic conditions.

Sweating of extremities is associated with the diminished blood supply resulting from the conditions of the blood vessels caused by severe emotional disturbances. Raynaud's disease, in which insufficient circulation brings on dry gangrene of the fingers and toes, may result in the more severe cases.

The temporary condition is "seen in young adolescents of somewhat unstable temperament, who manifest periodic 'blackout' under conditions of excitement, homesickness, worry, and the emotional shock of battle," the physician writes.

"Every medical officer in the armed forces has seen them in great numbers, and I have frequently seen them in civilian life in anxious medical students before an important examination.

"In those cases in which the emotional disturbance is severe or prolonged a permanent blurring of vision in one or both eyes may occur. This is associated with a dull pain in or behind the eyes; a tiny blind spot in the center of the field of vision and a distortion of objects. In these cases the eye specialist may actually see a tiny hole in the center of the retina and this hole is permanent."

Science News Letter, May 31, 1947

PSYCHOLOGY

Pilots of Future May "See" Sound

➤ IN THE FUTURE you may be able to "see" sound. What you hear may tell you where a thing is or what it looks like.

A series of buzzes, boops and swoops of sound may give the pilot of an airplane coming into an airport an illusion of a line drawn across the sky. This arrow painted in sound will point directly to his landing field.

This possibility is visualized by Dr. Clifford T. Morgan of the psychological laboratories at the Johns Hopkins University. It is one of the developments which he foresees from an extensive research program for the U. S. Navy Department. Dr. Morgan calls the program "long-haired, pure research on sounds."

Experiments are being conducted with different kinds of noises to discover which ones are most easily heard and most easily distinguished from one another. How easy, for example, is it to tell one very short burst of sound from another of a different pitch? How many different kinds of complicated sound can be invented? Which kinds of noise are best to use for signaling?

These and many others are only questions. The answers will have practical applications in the noisy world of tomorrow.

Science News Letter, May 31, 1947

PSYCHOLOGY

Solving Your Problems

▶ HOW YOU SOLVE your personal problems tells what kind of personality you have. This new way to size yourself up and sort out your friends was proposed to the Midwestern Psychological Association meeting in Chicago by Prof. Robert H. Seashore, of Northwestern University.

It is a better way to pigeonhole individuals than the old way of sorting them into go-getters or solitary thinkers. It would serve psychiatrists better than the classical medical division into schizophrenic, manic-depressive, and paranoid.

Everybody, at one time or another, uses all these ways of tackling problems. Which one is your favorite?

Direct attack. The person who goes straight at the trouble, working all the harder, or improving his technique when things are too difficult.

Going around. This man dodges obstacles and tries a new approach when one method doesn't seem to work.

Escape. He ignores problems or stalls for time until something happens to relieve him of the problem.

Diversion. He throws up a smoke screen in the form of a temper tantrum to distract attention from the main issue.

"Sour grapes." This man pretends to himself and others that the question wasn't very important anyway—that he never really wanted to solve it.

"Basking." He hangs around with successful people so that he will get credit for their bright ideas.

"Passing the buck." He blames failures on other people or circumstances.

Spotlight seeking. When he can't succeed, he tries to get attention, even if it is unfavorable because it is better than being ignored.

Giving up. He acts childish or plays sick in order that people will not expect him to solve the problem.

Forgetting.

Daydreaming. He ignores real problems while he dreams of imaginary successes.

Science News Letter, May 31, 1947

PHYSICS

Tiny New Battery Cell Has Low Temperature Efficiency

▶ TINY ELECTRIC batteries, developed for war uses, may find many applications in civilian life because of their small size, efficiency at low temperatures, and the comparative ease with which they can be prepared. In its present form, however, this cell has definite limitations, one of which is that the acid used is dangerous to handle.

It is the perchloric acid primary cell, with lead, lead dioxide, and perchloric acid as its active materials. One of its principal war uses was in radiosonde equipment, which was sent high into the atmosphere by small balloons to report weather conditions auotmatically by radio code.

The preparation of these batteries was described to the Electrochemical Society meeting in Louisville, Ky., by J. C. White, Naval Research Laboratory, Washington, D. C., and former associates, W. H. Power, R. L. McMurtrie and R. T. Pierce, Jr. The cell was developed at the National Bureau of Standards by J. P. Schrodt, D. N. Craig and G. W. Vinal.

This electric cell contains plated lead dioxide positive plates, metallic lead negative plates, and aqueous perchloric acid electrolyte. The soluble nature of the discharge product, lead perchlorate, permits relatively high currents to be drawn from the cell at temperatures as low as 20 degrees below zero Centigrade.

The perchloric acid primary cell can be easily prepared without the use of special apparatus or techniques. Lead oxide can be readily plated on nickel screen for the positive plate, and lead sheet or a lead-plated grid make good negative materials.

The cell in its present form has limitations for general use. No material for the positive side of the cell, other than the precious metals, has been found which will resist attack in contact with perchloric acid and lead dioxide for more than a few days. Cells using nickel grids must not be filled with acid until immediately before discharge. The dry battery in storage should last indefinitely, however.

Science News Letter, May 31, 1947

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HORTICULTURE

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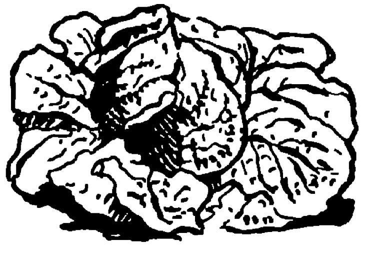
by Frank Thone



From Many Lands

➤ ALL QUARTERS of the globe meet at the crossroads of our garden paths Contributions from the Old World predominate, for we are after all transplanted Europeans but the Americas make substantial offerings as well

The triad that every home gardener sets out, no matter how tiny his plot - lettuce, radishes, and onions—all seem to have started somewhere near the eastern end of the Mediterranean At any rate, they were there at the dawn of history, for we find them mentioned in ancient Egyptian inscriptions There is one document about the earliest strike on record laborers in some pharaoh's monumental project refused to go back to work until they got more radishes and onions to eat with their bread

Cabbage is European, from the chalk cliffs of England, and across the North Sea in Denmark and the Low Countries Wild cabbage still grows in these places, though you would hardly recognize the little, open rosette of leaves as ancestral to the tight round heads we harvest—or hope to, anyway The cabbage-head is really an exaggerated central leaf bud

Carrots and beets are of Eurasian origin also Although carrots have run wild in this country as a weed (Queen's lace), beets have shown no tendency to do so Peas, too, are from the Old World, as are cucumbers and cantaloupes Watermelons are African in origin

New World vegetables include potatoes, tomatoes, green peppers, pumpkins, most squashes, and all beans except the little used Windsor or broad bean and the table soybean which is just coming into real popularity Sweetcorn, too, is American, though the Indians made little use of it before the arrival of white men

Some of these American vegetables reached our gardens by roundabout paths Potatoes, for example, were carried to continental Europe from South America, thence to England and Ireland, from there to Bermuda, and finally to the colony of Virginia

You may smoke while you cultivate your garden You may also use a nicotin spray to combat certain insect pests In either, you are making use of another American plant tobacco was used by most of the Indians of both continents when Columbus landed, and was not known before then in other parts of the world

Science News Letter May 31 1947

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PHOTOGRAPHY

Lens Changes Instantly From Long to Close Shots

➤ LONG SHOTS and close ups will cause motion picture camera operators no trouble in the future, thanks to a new lens that makes it possible to instantly change from one to the other The lens is not yet ready for production, but will be soon A version of it for television is perfected and has already been demonstrated

The type demonstrated is the Fairbanks television lens developed for Jerry Fairbanks, Inc, by Dr Frank G Back Called also the Zoomar lens, it was recently given tests in the laboratories of the National Broadcasting Company in New York It gives increased efficiency and flexibility, it is claimed

The motion picture lens, which should be completed in six months, is a more compact version of the Zoomar lens than the television type It is for use in the 35 millimeter field, either in the studio or in the open in taking newsreels It gives the newsreel unlimited scope Any event can be photographed with one camera without interruption as the cameraman regulates the lens for the proper focal ranges

Science News Letter May 31 1947

MEDICINE

New Vitamin to Be Found Will Aid Anemia Victims

➤ A NEW VITAMIN is waiting to be discovered It exists in liver and will help pernicious anemia victims It might be called, when discovered, the anti-nerve-degeneration vitamin because its function would be to prevent the nerve degeneration that develops in some patients with pernicious anemia

Existence of the vitamin is suggested by studies reported by Dr Tom D Spies of the University of Cincinnati and the Nutrition Clinic, Hillman Hospital, Birmingham, Ala, at the meeting in New York of the Spies Committee for Clinical Research

Synthetic folic acid, newest member of the vitamin B family acts as an important blood builder in many kinds of anemia, including pernicious anemia It cannot, however, be counted on to protect against the nerve degeneration that sometimes develops in pernicious anemia The condition begins with the feet and hands tingling and 'going to sleep' and may go on until the patient is incapacitated or paralyzed if not treated Adequate amounts of potent liver extract protect against it

"These observations suggest there is another important nutrient awaiting discovery," Dr Spies said "Many anemia patients who become allergic to liver extract can be safely and securely treated with folic acid as long as they do not develop nerve degeneration"

The anemias of sprue, pellagra and pregnancy and nutritional macrocytic anemia are all helped by folic acid

"It is amazing," Dr Spies stated, "that patients with tropical sprue, who subsist on a diet composed almost entirely of starchy foods, regenerate (rebuild) blood when they are given folic acid even when they continue to eat such a diet"

Science News Letter May 31 1947

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AMERICA'S NEEDS AND RESOURCES—J Frederick Dewhurst and assoc—*Twentieth Century Fund*, 812 p, $5 A survey of America's achievement in wartime and peacetime production with estimates for the future shows the trend toward increased productivity as the result of expanding use of machines and inanimate energy The resultant benefits are more consumer goods and shorter work weeks

AMERICA'S STAKE IN WORLD TRADE—Gloria Waldron and Norman S Buchanan—*Public Affairs Committee* Pamphlet No 130, 32 p, paper, illus, 20 cents Covers the relation of trade to world economy

BIBLIOGRAPHY ON SCIENTIFIC PERSONNEL AND ITS RELATION TO THE CONDUCT OF RESEARCH IN GOVERNMENT, INDUSTRY, AND UNIVERSITIES—Scientific Personnel Branch—*Office of Naval Research*, Info Series 4, SPB Series 16 22 p, paper, free Assembled from books pamphlets, magazine articles, and legislative items this compilation is intended for personnel officers, operating officials and scientists

BUSINESS MATHEMATICS PRINCIPLES AND PRACTISE—R Robert Rosenberg—*Gregg Pub*, 3rd ed, 568 p, $1 84 A text for vocational courses in business arithmetic covering fundamental principles

CHEMISTRY AND METHODS OF ENZYMES—James B Sumner and G Fred Somers—*Academic Press*, 2nd ed rev, 415 p illus, $6 50 A survey of enzymes for the research worker and advanced student

CYCLES THE SCIENCE OF PREDICTION—Edward R Dewey and Edwin F Dakin—*Holt*, 255 p, $3 With numerous graphs the authors show trends in many fields over long and short periods of time They imply that by investigating these, undesirable trends may be prevented

THE CONSUMER'S ECONOMIC LIFE—Jessie Graham and Lloyd L Jones—*Gregg Pub*, 555 p, illus, $1 92 For secondary schools, a text to help the student plan intelligently the selection, purchase and use of goods and services

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ELECTRICITY Principles, Practise Experiments—Charles S Siskind—*McGraw Hill*, 448 p, illus, $2 60 A text for senior high schools and junior colleges, this presentation of the general principles of direct and alternating current electricity shows how these principles apply to the more common circuits and how they may be experimentally verified

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WHO'S WHO IN LATIN AMERICA PART IV BOLIVIA, CHILE, AND PERU—Ronald Hilton, ed—*Stanford Univ Press*, 3rd ed rev, 209 p, $2 50

Science News Letter, May 31 1947

PSYCHOLOGY

Brain Waves Show Students Should Study Longer Hours

➤ BRAIN WAVES spell bad news for students who complain of brain fag at the end of an eight hour class day

The eight-hour day does not produce severe mental fatigue and should be lengthened, Drs T C Barnes and Marie D Amoroso, of Hahneman Medical College, Philadelphia, reported to the Federation of American Societies for Experimental Biology meeting in Chicago

Students' brain wave records at eight a m and five p m told the story Alpha waves, which disappear when persons are tired out, were still present in the students' five p m records

Science News Letter May 31 1947

CHEMISTRY

Sulfuric Acid Sludge Used In Phosphate Production

➤ FOOD PRODUCTION calls for fertilizer, and among fertilizers phosphate is one of the most important Unusual interest therefore attaches to a newly patented process in which sulfuric acid sludge, a waste product in oil refining, is used instead of new sulfuric acid in treating ground phosphate rock to produce superphosphate fertilizer

In the method now in use, a mixture of phosphate rock and sulfuric acid is left for a time in "dens", while the gases caused by the acid's action froth up and lighten the product Even so, it takes stiff digging, sometimes blasting, to get it out for sacking and shipping

By using the sulfuric acid sludge, claims John Stauffer, Jr, of Los Angeles, originator of the process, the mixture in the dens foams up more thoroughly, due partly to the evaporation of the residual hydrocarbons in the sludge, and when the finished fertilizer has dried out it is already in powder form, ready to flow down chutes into the bags

U S patent 2,418,203 has just been issued on this process

Science News Letter, May 31 1947

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✽ *SLIDE RULE for druggists is a direct reading calculator for weights and measures, temperature and formula conversions Made of plastic, it is easily cleaned It is suitable for chemists, photographers and other laboratory workers*

Science News Letter May 31, 1947

✽ *SPIRIT LEVEL, about one foot long, for carpenters and other workers, is made of a transparent plastic with seven small spirit tubes to indicate various angles The center tube is used for leveling The others are for six different angles, the degree of each being molded into the plastic*

Science News Letter May 31 1947

✽ *MINNOW BUCKET for fishermen keeps the bait alive in constantly changing water It is a double cylinder device, with an inner container for the fish, and it floats as shown in the picture When floating water enters between the inner and outer walls, and into the fish chamber through holes near the top*

Science News Letter May 31 1947

✽ *THREE BAND portable radio, for use in pleasure boats or airplanes, provides air and marine communications reception and regular radio programs It can be used as an aid when navigating on aviation range stations, marine radio beacons and broadcast stations The radio is battery or generator-powered*

Science News Letter, May 31, 1947

✽ *STEEL measuring tape has a case flattened on one edge for easy standing, and a plastic window on the curved opposite side through which the tape is read A cross hairline makes reading easier When the tape is completely rolled, the hairline reading is two inches, which is also the length of the base of the case*

Science News Letter, May 31, 1947

✽ *COLLAPSIBLE hanger can be slipped into or out of a dress or blouse without unbuttoning the garment One arm of the plastic device is hinged and can be extended or folded up by the flick of a trigger*

Science News Letter May 31 1947

Question Box

ASTRONOMY

How successful was the eclipse expedition? p 340

What besides the moon will be the brightest object in the June skies? p 344

BIOCHEMISTRY

How should you drink coffee if you want it to give you pep? p 341

CHEMISTRY

How is goldenrod rubber toughened? p 345

MEDICINE

How can chiggers be kept away? p [illegible]

How can sprained ankles be cured without taping? p 347

What is the newest way of relieving childbirth pain? p 341

Why is Russian KR cancer endotoxin not available to U S patients? p 339

NUTRITION

How does a good diet increase pneumonia susceptibility? p 344

PSYCHIATRY

What is the secret of the success of the new treatment? p 338

What pill makes children brighter? p 344

PHYSICS

How can the umpire keep uncomplimentary remarks of the players from reaching the spectators? p 345

Where published sources are used they are cited

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SCIENCE NEWS LETTER

Linlithgow Library.
Imperial Agricultural Research Institute
New Delhi.

A SCIENCE SERVICE PUBLICATION

RCA Miniature Tubes enhance the tonal brilliance of RCA Victor Globe Trotter portable radios

She shall have music wherever she goes!

Wherever you go with an RCA Victor Globe Trotter portable radio you'll enjoy richness and clarity of tone—volume enough for outdoor dancing—made possible through tiny tubes

Miniature tubes save valuable space in small radios—space that can be used for larger and better loudspeakers and for longer lasting, radio-engineered RCA batteries

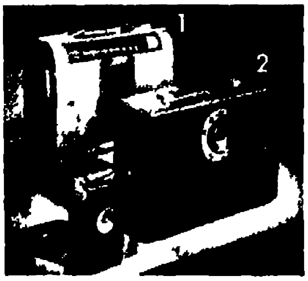
These miniature tubes were developed by RCA Laboratories—a world center of radio and electronic research—and long a leader in development of electron tubes for all purposes.

At RCA Laboratories the same research experimentation and advancement that resulted in these improved tubes, keep all RCA products and services at the top in their particular fields

When you buy a product bearing the name RCA or RCA Victor—a radio set, television receiver, Victrola radio-phonograph, a radio tube or phonograph record—you get one of the finest products of its kind that science has yet achieved

Victrola 'T M Reg U S Pat Off

Radio Corporation of America RCA Building Radio City, New York 20 Listen to the RCA Victor Show, Sundays, 2 00 P M, Eastern Daylight Saving Time, over NBC.



Ideal traveling companions (1) RCA Victor Globe Trotter" portable radio—operates on AC DC, or batteries (2) RCA Victor "Escort"—has a battery *you* can recharge from any ordinary AC electric outlet (3) RCA Victor "Solitaire"—less than 6¾ inches tall!

RADIO CORPORATION of AMERICA

CHEMISTRY

Cosmic Rays Make Carbon

Radioactive carbon is constantly being created and is a part of every person. What part it plays in our lives is not yet known.

➤COSMIC RAYS are constantly creating radioactive carbon, and apparently have been doing so for ages. Since carbon is an essential element in all living things, we are all full of these radioactive atoms, take in more with every mouthful of food we eat, lose some in our body wastes and with every breath we exhale. What role this ray-created radioactive carbon plays in our lives nobody knows, for its existence has only just been discovered.

There were theoretical reasons for supposing it might exist, but demonstration of its actual presence in living organisms and in recently dead organic matter was announced in *Science* (May 30), by a six man research team.

The theoretical suggestion with which they started was that if a cosmic ray should strike a nitrogen atom in a certain way it would convert it into an atom of radioactive carbon, with an atomic weight of 14, as compared with 12 for ordinary carbon. Carbon 14 is fairly long-lived for a radioactive element, its half-life is 5,000 years. But given long enough, it all breaks down into other elements and thus vanishes.

The researchers tackling the problem reasoned that if they could get carbon samples of very recent organic origin some of the atoms might be of the C_{14} variety. Contrariwise, carbon samples of quite ancient organic origin should contain few or none of these radioactive atoms.

An easy way to collect carbon samples is to capture some methane gas, which has one atom of carbon and four of hydrogen in each of its molecules. Methane is produced in the bacterial fermentation of decaying matter, it is also given off by some kinds of petroleum.

The researchers got their "recent" methane from Baltimore's city sewage disposal plant, their "ancient" gas from crude oil. They used the lofty towers of a commercial oil refinery to concentrate their samples, in order to get the largest possible quantity of radioactive carbon in a relatively small volume. Then they tested their two samples with Geiger counters, which, as everybody has known since Bikini, sound off with a tick when a radioactive atom explodes in their vicinity.

They had previously calculated the number of ticks they ought to get per minute from "recent" methane, or as they called it, biomethane. The Geiger counters ticked off a count very close to the calculated value. From the "ancient" or petromethane they got very few ticks, which was also according to previous calculation.

They now think that the radioactive carbon content can be used as a means of telling the age of any given piece of organic material that hasn't been dead too long—a Pharaoh's mummy, for example, or the skull of a cave man.

The research team that did this work consists of E. C. Anderson and W. F. Libby of the University of Chicago, and S. Weinhouse, A. F. Reid, A. D. Kirshenbaum and A. V. Grosse of the Houdry Process Corporation.

Science News Letter, June 7, 1947

METEOROLOGY

Damage to Wheat Crop From Cold Wave Expected

➤ DAMAGE to the wheat crop from the sudden and dismaying cold wave that hit the Plains area and the Midwest last week and then moved into the Great Lakes region and the Ohio valley is expected by scientists at the U. S. Weather Bureau.

Sample minimum temperatures were: Cheyenne, Wyo., 16; Grand Island, Neb., 24; Valentine, Neb., 26; Sioux City, Iowa, 27. These degrees of chill are enough to do material harm to both winter and spring wheat, upon which world hopes of freedom from want in the coming winter largely depend. Millions of family vegetable gardens, planted to fight the high costs of food, have undoubtedly been blighted, as well as more extensive truck farms intended to supply city markets.

There is one bright spot in the picture—which oddly enough is a result of previous unfavorable weather. Because it has been so wet and chilly all spring throughout the great central valley of this country, corn and soybean planting has been much delayed. A considerable part of the acreage in these two important crops is still unplanted, and most of the seed in the ground has not yet sprouted. It is probable therefore that corn and soybeans suffered little damage.

This cold wave, most unusually severe for this late date, is a result of a kind of meteorological sideswipe, Weather Bureau meteorologists say. First, a storm area of Pacific origin moved eastward across the mountains. Then a great mass of Arctic cold air came down from Canada. Their clash over the High Plains in the West is what gave Denver its heavy snowfall. Progress of the storm area sucked the cold air after it, bringing the country-wide sweep of the cold wave.

Science News Letter, June 7, 1947

FOOD TECHNOLOGY

Dehydrating by "Thirst"

➤ DEHYDRATED foods, usually prepared by one or another type of heating process, are made on a new basis in the process covered by patent 2,420,517, issued to J. D. Brandner and R. M. Goepp, Jr., Atlas Powder Company chemists. They get most of the water out of vegetables and fruits by exposing them to exceedingly "thirsty" compounds, such as some of the sugars, and merely finish the job by evaporation.

Science News Letter, June 7, 1947

DETECTOR—This device detects moving objects by the reflection of radio waves. The light comes on when an object or a person is moving toward or away from the equipment.

AERONAUTICS

Rural Air Traffic Control

Radar stations in eastern states could assist bad weather traveling of aircraft between ports. They would not be used for bad weather landings.

➤ TWENTY scanning radar stations properly distributed in the eastern portion of the United States could be used to control effectively airplane traffic in open spaces between airports, the American Society of Mechanical Engineers in Los Angeles was told by Dr L A DuBridge, president of the California Institute of Technology

The radar pictures from all 20 screens could be transmitted by radio to a central control station, or each station could tune in and see the pattern of any other station," he said "The radar picture can even be radioed to the pilot so he can see for himself where he is and what traffic pattern he is in"

These stations could assist in bad-weather traveling but would not be used for bad weather landings Other instruments, including the radar radio ground control approach device (GCA), are needed in the actual landing Long range ground radar stations are needed at airports, he said They can provide a ground control officer with full information of the actual traffic pattern over a wide area This system is now being tested at the National Airport in Washington, D C

Plastics in Planes

More than 300 applications of over 20 different plastic materials are used on present day luxury transports, such as the new DC-6, R J Considine of the Douglas Aircraft Company stated at the same meeting The development of plastics for use in airplanes is evolving at approximately the same rate as the airframe itself, he said

Plastics were used as substitute materials because of shortages during and immediately following the war, but many of their applications have become permanent because of their excellent record

The reason for increased use of plastics in aircraft is to be found in the strength weight ratio Designers are on a never-ending quest for new materials with a higher strength in proportion to weight But plastics or any other materials are not employed in present air frame design, he asserted, unless they will do their particular functions as well as, or better than, any other material known to the designer

Science News Letter June 7 1947

CHEMISTRY

Amorphous Carbon Made From Oil in New Process

➤ AMORPHOUS CARBON, impalpably fine, sooty black stuff useful as rubber filler and for pigment purposes, is economically produced from the poorest grades of crude oil by a process on which U S Patent 2,420,999 has been granted to Joseph W Ayers of Easton, Pa The oil is injected as a high pressure jet into a closed retort, along with a stream of air to produce partial combustion at temperatures ranging from 2,000 to 3,000 degrees Fahrenheit At the other end, a continuous stream of carbon black is drawn off, collected with an electrostatic precipitator and stored until ready for packaging Rights in the patent are assigned to the Phillips Petroleum Company

Science News Letter June 7 1947

ORNITHOLOGY

Male Birds' Crows Counted To Give Pheasant Census

➤ TURNING OUT before dawn to count the number of crows of the cock pheasants is one of the springtime tasks of the field biologists of the North Dakota State Game and Fish Department This pheasant crowing count is a new census technique used when the pheasant census is fairly low, replacing the usual roadside count

In making a pheasant-crowing count a township is chosen for a study area The biologist begins his count 20 minutes before sunrise He stops his car every two miles and records the number of pheasant crows heard in two minutes This is believed to be a reliable census technique because a male pheasant does not crow more than once in two minutes and the call can be heard about one mile This count is conducted for one and a half hours in the early morning Pheasants crow only in April, May and June

This unusual wild game count was developed by Jim Kimball of the South Dakota conservation department It is now widely used in the Dakotas to determine the state game pheasant population Results of these game surveys in the spring determine whether to open the season in the various counties It is also used to set the bag limits for fall hunting

A high-frequency radio receiving set which picks up only the crows of the pheasants has been developed by the federal aid coordinator of the Game and Fish Department at Bismarck to aid in taking the pheasant-crowing count

Science News Letter June 7 1947

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AERONAUTICS

Flying Auto Foreseen

Car with wing, tail and other attachable parts to make it an air vehicle presents many problems not yet solved. It may be a true automobile.

➤ SOME DAY you may drive your automobile to the airport, hitch on wings, tail, propellers and a few other gadgets, and take to the air

This will be possible with a proposed flying automobile It is to be a true automobile, with attachments to permit it to fly It is not what flying men call the roadable airplane This is a plane with wings which can be folded or detached In appearance, however, it is still a plane, and an odd sight on the road

There are many difficulties to overcome before the flying automobile becomes a reality Possibilities and difficulties were presented to the Institute of the Aeronautical Sciences meeting in Detroit by Joseph M Gwinn of Gar Wood Industries, Inc, Detroit The flying automobile is much to be preferred to the roadable plane, he said, because the combination vehicle will ordinarily be used far more on the road than in the air

The flying automobile might be the conventional car with added structure and power to fly, or it might be a flying automobile designed entirely to aircraft weight standards The second seems to be his preference But it would be of normal car size and shape, with ride, speed and acceleration equal to those of a regular automobile If a conventional car is to be used, wheel suspension, wheels, tires, brakes, chassis strength, attachment points will all require major changes

The special car suggested by Mr Gwinn would have one engine only, but it would have to be of 250-horsepower This presents one problem how to use an engine of this power on the highway at low speeds As an airplane the center of gravity must be farther to the rear than it is in ordinary automobiles This can be accomplished by structural changes and positioning of the load

The wings would be attached slightly ahead of the rear wheels Assuming the airplane is of conventional type, it will carry tail surfaces back of the wing, and a fuselage connecting wings and tail

The propeller would be located to the rear, behind the rudder It would be removable, with the flying structure in a single piece Landing gear is another problem Special tires, shock absorbers and a swing rear axle, hinged on each side of the differential, were suggested Other problems, and possible solutions, were presented

Science News Letter June 7 1947

AERONAUTICS

Airplane Refueling Delay Cut by Underwing Valve

➤ AIRPLANE DELAY for refueling at way stations will be greatly lessened by the use of a new valve equipment which permits fueling at speeds four times greater than present methods

The new device, designed by Parker Appliance Co, is for underwing fueling, a method used on some large transports In this, the openings through which the gasoline is forced up and into the airplane's tanks are located on the under surface of the wings One advantage is that ground attendants do not have to climb with ladders onto the wings carrying a hose to upper openings

Air line companies are much concerned with ground delays whether caused by necessary reconditioning of the plane itself or with red tape methods of ticketing and loading passengers or baggage, and are looking for shortcuts In transcontinental trips, refueling en route considerably increases the elapsed time from terminal to terminal

The new device permits the passage of 200 gallons of gasoline per minute, and it shuts off automatically when the tank is properly filled The valve has two parts, one on the fuel tank and the other on the hose nozzle which is inserted in the plane's opening Interlocking safety features make it necessary to lock the nozzle onto the tank unit before the nozzle and tank valves, working together as a unit, can be opened to permit flow

Science News Letter June 7 1947

NUTRITION

Soybeans in Cereal

➤ THE UBIQUITOUS soy bean finds its way into shredded breakfast cereal in the formula on which W P Penty of Battle Creek, Mich, has obtained patent 2,421,216 The oil is first extracted, then the protein rich residue, finely ground, is cooked and pressed into shreds along with ground grain Patent rights are assigned to the Kellogg Company

Science News Letter June 7 1947

REFUELING VALVE—Underwing valve cuts down refueling delays.

NUCLEAR PHYSICS

Atom Fusion Gives Energy

Fusion of atoms gives more energy than fission of them. Atoms must be accelerated to a much greater degree than has yet been possible.

➤ FUSION of small atoms to make bigger ones would give more atomic power than splitting large ones like uranium, yet present day atomic fission gives out only one part in a thousand of the potential atomic power, declared Dr. Samuel C. Lind, dean of the University of Minnesota Institute of Technology, at the Remsen Memorial Lecture at the Johns Hopkins University in Baltimore.

For every gram of uranium split, whether in bomb explosion or by slow fission, Dr. Lind said, 999 parts of the heavy metal remain unchanged. Whether we will ever be able to convert the rest of the mass to energy by complete annihilation is, in the opinion of the Minnesota professor, at the present time pure speculation. But fusion of small atoms to make heavier ones, with a gain of about ten times the energy we are now able to get from fission, would be brought about if the problem of accelerating these small particles to a much greater degree than has yet been possible could be solved.

Speaking on the subject of "Fifty Years of Atomic Research", Dr. Lind traced the discoveries of the present century and predicted greater ones to come. At the beginning of the century the atom was considered only a theoretical idea. Belief in it as a real object was one of the contributions to science made by the late Dr. Ira Remsen, first professor of chemistry at the Johns Hopkins University, Dr. Lind stated.

At the beginning of this century, he said, the doctrine of the atom as a real particle was under attack by the German scientist, Prof. Wilhelm Ostwald. Dr. Remsen, who at about that time gave up his chair of chemistry to become Johns Hopkins' second president, felt that, in spite of certain illogical conclusions to which the theory of the atom at that time led, the idea was symbolic of great truth, and urged its continued use to explain the then newly discovered radioactive phenomena.

Science News Letter, June 7, 1947

AGRICULTURE

Munitions Bring Hunger

Main munitions elements are also important fertilizers. Even after a war it takes time to convert them to making food instead of gun powder.

➤ ONE OF THE main reasons most of the world is hungry, with no immediate likelihood of getting enough to eat, is the ironic fact that the three principal fertilizer elements– nitrogen, phosphorus and potassium,—are also important ingredients of munitions. So when a war comes, we all have to tighten our belts so that we may more effectively blow each other to bits. Even after a big war, it takes a long time to reconvert this all important chemical triad to the ways of peace.

This is dramatically brought out by Dr. D. A. Fitzgerald, in his report as Secretary-General of the International Emergency Food Council.

Situation is worst, probably, in nitrogen fertilizers. The once gigantic nitrogen fixing industry of Germany, which before the war produced 700,000 tons, 100,000 tons of which could be exported, will turn out during the current year less than half that quantity. Germany will have to import 40,000 tons of nitrogen fertilizers. Like situations prevail also in Japan and Korea, which in prewar days produced their own nitrates.

With the notable exception of mineral nitrates exported by Chile, most of the nitrogen fertilizers that reach the market are made synthetically out of atmospheric nitrogen. Two compounds are synthesized, ammonia and nitric acid. These can be combined, as ammonium nitrate, which is an excellent fertilizer. Trouble is, war time needs placed both American and German ammonia and nitric acid plants far apart. Demobilization in this country, and industrial disarmament in Germany, have thus far prevented a shift from munitions nitrogen to food making nitrogen. There are only five nitrogen exporting countries now (of which the United States is not one)—and well over a score of countries that need to import this indispensable element. To make matters worse, the countries needing it most are least able to pay.

World production of potash is up 3.1 million tons as compared to the prewar figure of 2.7 million. The picture would be almost cheerful, if only Germany were able to resume its prewar place as world's leading producer. But the biggest German potash beds are in the Russian occupation zone, so German potash exports are expected to fall short of the needed figure. French potash production was cut by delay in delivery of American mining machinery, shortage of coal, and the severe winter. Spanish potash production is also below par.

Phosphorus production prospects give reason for moderate optimism. Phosphate rock production in the United States and North Africa is big and getting bigger. Missing from the picture is the Pacific island phosphate rock production, disrupted by the ruin of the Japanese empire. Soluble phosphates also are on the upgrade, except in Germany and Spain.

Key to a large part of all fertilizer troubles is industrial energy, and in most places that means coal. And, for Europe at least, coal means getting British production up, and above all getting the Ruhr mines going full blast again. Once that is done, there is a better chance of square meals on Europe's tables.

Science News Letter, June 7, 1947

ENTOMOLOGY

Fog of DDT Gets Under Surfaces

See Front Cover

➤ TO TAKE the sting and bite out of going to the races, a superfine fog of DDT is sprayed on the grandstands to kill flies and mosquitoes. It envelops everything in its path. The particles are so fine that eight of them can be laid across the edge of a razor blade.

DDT fog is also good in dairies and on farms, it makes happier cows that are not pestered with flies to flick off.

Science News Letter, June 7, 1947

MEDICINE

Relief Drugs Announced

Asthma and disorders of blood circulation and the heart can be better treated with chemicals recently developed

➤ BETTER TREATMENT for victims of asthma, heart disease and disorders of blood circulation was announced at the meeting in Chicago of the Federation of American Societies for Experimental Biology.

For asthma sufferers is a chemical compound called Isuprel, said to be the most efficient for controlling asthma of all similar compounds yet studied. It was reported by Drs. A. M. Lands, O. H. Siegmund and H. R. Granger of Frederick Stearns and Co. research laboratories at Detroit.

It would be used in place of epinephrine, or adrenalin, of which it is an analogue. It is 100 times less toxic than adrenalin and can be given by mouth or can be inhaled as well as being injected under the skin. It is the same chemical widely hailed in reports from Europe under the name, Aludrine, and should be available in the U. S. shortly.

People with poor circulation get a marked warming of hands and feet by Priscol pills. This new drug can be used to treat Raynaud's disease and other conditions of poor circulation, Drs. J. P. Hendrix, M. J. Reardon, and F. A. Marzoni, Duke University scientists, reported.

Priscol relaxes the arteries, blocks the blood pressure raising effect of adrenalin, and allows the heart to pump more blood through the arteries, thus improving circulation. It is related to histamine, a normal body chemical which also dilates blood vessels. Priscol, also, has been used in Europe but has only recently received attention in the U. S.

Many patients with advanced heart failure will get more specific benefit from mercury compounds than from digitalis, old stand-by in treating heart disease, three New York pharmacologists find. They are Drs. Walter Modell, Morris Pearlmutter and Donald A. Clarke of New York Hospital, Cornell Medical Center, Beth Israel Hospital and the Hospital for Joint Diseases.

Digitalis, generally given a position of first importance in the treatment of heart failure, acts directly on the heart muscle to increase the force of its contractions. Frequently, however, especially in more acute cases, digitalis does not relieve all the symptoms. In order to achieve complete relief, additional measures become necessary, and to this end, mercury compounds are used. These agents act on the kidneys to increase the formation of urine, resulting in withdrawal of excess fluid from vital organs in which it has accumulated due to the heart condition.

Science News Letter, June 7, 1947

CHEMISTRY

New Lamp Widens Field Of Light As Catalyst

➤ CHEMISTRY has a new tool. It is a powerful 3,000 watt mercury vapor lamp which will greatly widen the application of light to chemical reaction in the so-called photo-chemical process.

The use of light to cause a chemical change is well known in photography and textile bleaching, but knowledge of its use to assist chemical reactions in industries is confined largely to the trade. In photography the action of the light is direct. It causes a chemical change in the sensitized film to make the negative from which the finished picture is printed. In the industries, light is also used as a catalyst to assist chemical reaction.

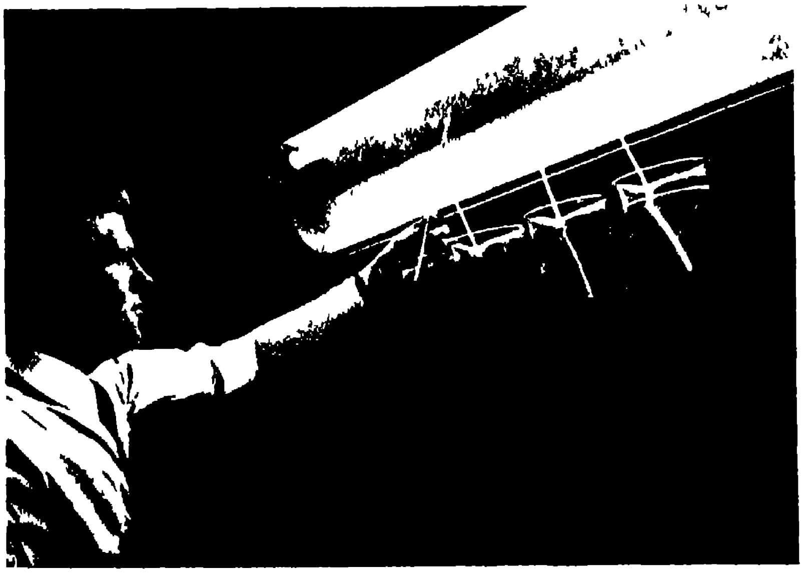
The new lamp is a development of Westinghouse Lamp Division. It is a 55 inch-long tube, containing the mercury vapor, made of special glass which permits the passage of photochemical wave lengths. These include both invisible ultraviolet and visible light radiations. Both ultraviolet and certain visible light wavelengths may serve as catalysts to bring two chemicals together quickly, causing a reaction to form a new product.

The lamp is able to achieve photochemical changes because its radiations vibrate at a high frequency, Eugene W. Beggs, Westinghouse scientist, explains. When the rays are absorbed they distort the electronic structure of the atoms and molecules, forcing them to line up in new form.

Photochemical processes are widely used in the chemical industry. In recent years they were employed in developing some of the new synthetic rubbers, solvents and lacquers. Photochemical rays were used by Westinghouse in the chemical preparation of samples of uranium for the early atomic bomb research work.

Science News Letter, June 7, 1947

In mowing *lawns* the stubble should be left nearly two inches high, experts state; this stimulates root development.



"ALADDIN'S LAMP"—This lamp generates photochemical radiations to act as catalysts in chemical reactions.

FOOD TECHNOLOGY

Creamy-Like Fruit Ice Contains No Milk or Water

➤ THE LATEST thing in desserts is cold and creamy like ice cream but contains no milk or cream It is a fruit ice without any water

The new dessert, which can be made in your refrigerator tray or hand freezer, uses the puree of whole fruit instead of water or fruit juice The puree is made by pressing the pulp through a screen to remove skin, seeds and fibrous parts Other ingredients are sugar and gelatin

Dr J C Hening of the New York State Agricultural Experiment Station devised the new dish He recommends 50% puree in the dessert and has used strawberries, raspberries, peaches and apples individually or in combinations with good results Dr Hening conducted food studies for the Army Quartermaster Corps during the war

Science News Letter June 7 1947

HORTICULTURE

Tiny Green Beans Developed Can Be Cooked Whole

➤ GREEN BEANS that don't have to be cut or split when being prepared for canning or cooking have been originated at the New Hampshire Agricultural Experiment Station They are so small that it is only necessary to snip off the stems and the tips

The new variety, which has been given the appropriate name of Tiny Green, is a cross between Perfect Stringless, a variety from the Netherlands, and Refugee, an old standard American bean It was developed by Dr A F Yeager of the Station staff

Science News Letter June 7 1947

CHEMISTRY

Carbon Tet Mixture Keeps Phosgene From Forming

➤ SAFER fire-killing fluid for the "squirt-gun" type of extinguisher has been developed by David A McLean of the Bell Telephone Laboratories in New York U S patent 2,421,035 has been granted on his invention

Fire-smothering fluid generally used in this kind of extinguisher is carbon tetrachloride, familiar also as a household cleaning fluid It is almost ideal for most types of fires, for it evaporates into a gas that displaces oxygen, without which fire cannot keep going

However, when the fire takes place near metal, as in motor vehicle engine fires, an element of danger arises On the hot metal surface, which apparently acts as a catalyst, part of the carbon tetrachloride combines with oxygen from the air, forming phosgene, which is one of the most poisonous of the military gases used in World War I Fear of this danger prevents wider use of this otherwise excellent means of combating small fires, the inventor states

Mr McLean has found that phosgene formation can be suppressed by the addition of any of several substances to the carbon tetrachloride Among these substances are the quinones, sulfur, maleic anhydride and the nitroaromatic compounds

Science News Letter June 7 1947

CHEMISTRY

Two Useful Alcohols Made From Mash by Bacteria

➤ BUTYL and isopropyl alcohols, useful in many industrial applications, are produced from a starch- or sugar-containing mash by fermentation with a special strain of the bacterial genus Clostridium, in a process on which patent 2,420,998 was issued to S C Beesch and D A Legg of Philadelphia, assignors to Publicker Industries, Inc

Science News Letter June 7 1947

PLANT PATHOLOGY

Tomato Blight Disease Didn't Get Early Start

➤ LATE BLIGHT disease of tomatoes which spread disaster through thousands of fields in Eastern states last year, has thus far failed to develop to serious proportions this spring The interstate reporting service on this plague, set up by the U S Department of Agriculture, has had relatively little to report

Late blight did get a start early in the season in the farthest south tomato growing areas of Florida, Georgia and Alabama Then, as the growing season moved northward, there were two or three weeks of warm, dry weather over the Carolinas and Virginia The fungus that causes this disease thrives on warmth, but cannot stand dry weather

Tomato-growers who have been standing by with fungicidal sprays and dusts have been told by the Weather Bureau that it will not be necessary, for the immediate future, to go into action

Science News Letter, June 7, 1947

IN SCIEN

PALEONTOLOGY

Family of Ape-Men Found By Expedition in Africa

➤ THE NEWEST find of the South African ape-man seems to have been of a whole family, for remains of five, possibly six, individuals have been taken out of the stony floor of the cave at Sterkfontein, South Africa, Dr Robert Broom of the Transvaal Museum has reported to the editor of *Nature* (May 17)

Prize find, of course, is the skull of a toothless, elderly female, lacking only the lower jawbone, which was laid bare by a small blast Freeing the bones of the limy breccia in which they are embedded is proving a slow and difficult task, Dr Broom states Sufficient progress on the skull has been made, however, to enable him to make preliminary estimate of 500 cubic centimeters as its cranial capacity This is about the size of the brains of some present-day large apes, but only a third or a fourth the capacity of modern human crania

Says Dr Broom "I think there will be very general agreement that the being is not a chimpanzee or even closely allied to any of the living anthropoids, and that, though small, the skull has many resemblances to that of man"

Science News Letter June 7 1947

CHEMISTRY

Process Prevents Spoilage Of Seeds Stored in Bulk

➤ A NEW METHOD for preventing the spoilage of cottonseed, flaxseed and other seeds stored in bulk has been developed by four scientists of the Southern Regional Research Laboratory of the U S Department of Agriculture

Seeds thus stored take in oxygen and give off carbon dioxide, heating up and becoming rancid in the process The research quartet find that this process can be stopped by treating the seed with a number of compounds chemically related to the growth-control hormones Most effective are diethyl oxalate and ethylene chlorohydrin

The work was done by Marjorie Z Condon, F R Andrews, Madeline G Lambou and A M Altschul

Science News Letter June 7, 1947

E FIELDS

INVENTION

Easy-to-Use Microscope Has Adjusters at Base

➤ A MICROSCOPE that should be exceptionally convenient for students and research workers is the subject of patent 2,421,126, issued to Harvey N Ott of Buffalo The concentric knobs controlling both coarse and fine adjustment are situated at the bottom of the pillar, below the level of the stage, instead of near the top of the pillar as in present models The new arrangement makes it possible for the user to adjust his instrument without raising his hands from the table, and also places the tube adjustments close to those of the substage condenser

Science News Letter June 7 1947

RADIOPHOTOGRAPHY

Weather Maps of Pacific Sent by Radiophotography

➤ UP-TO-THE-MINUTE weather maps of the Pacific Ocean along the China-Hawaii California route are now constantly available to the U S Navy They are facsimile maps, transmitted by radiophotography

The complete maps are made from sectional maps prepared by central Navy weather stations at Guam, Pearl Harbor and San Francisco, and by the Naval Air Station in Washington These sectional maps are interchanged between the stations over the Navy's new radio photographic network that ties in long range transmission stations from Guam to Washington

Thirty minutes after the maps are delivered for radio transmission, all receiving stations have map sections available for operational use By putting them together they have a complete picture of the weather from Washington, D C, to the China coast

Facsimile transmission of maps, and of photographs or printed pages, is not new, but improved instruments and methods of the past few years have greatly extended the use of the process

In it, the copy to be sent is placed on a revolving drum where it is rapidly scanned by a sharp beam of light that cuts across it in closely-spaced parallel lines The reflected light, which varies in intensity with the light-to dark spots on the copy, strikes a phototube and sets up electric signals that vary in harmony with the light variation These signals may be transmitted by wire or radio waves The receiving instrument follows in reverse the procedure of the transmitter The copy is made on photographically sensitized paper

Science News Letter June 7 1947

AERONAUTICS

Glass Fiber Makes Best Noise-Reducing Material

➤ GLASS FIBER insulation in aircraft passenger cabins, to decrease outside noises such as those from propellers and engines, is still considered the best neutral cabin treatment, the American Society of Mechanical Engineers was told by Kenneth R Jackman, chief test engineer of Consolidated Vultee Aircraft Corporation

Recent tests made with various materials led to this conclusion, he said Fiber glass provided as light-weight and effective an acoustical and thermal insulating treatment as possible at the time the tests were made

The noises in an airplane cabin to which passengers are subjected come from propellers, engine exhausts, engine vibrations, ventilation systems, and noise originating within the cabin and aerodynamic noises decreased by better streamlining For years engineers have attempted to reduce noise at its source However, the trend in aviation is toward more speed and more power, consequently more external noise at its source Sound proofing the cabins seems the best present solution

Each noise contributor will stand a little investigation since the overall noise level can be reduced only by reduction in all the major noise components, Mr Jackman stated There is little to be gained by the installation of mufflers on engines until propeller noises, ordinarily greater than those from engines, are satisfactorily silenced

Aerodynamic noises, now usually less than those from either propellers or engines, seem to become more important with high speeds In an English investigation cited by the speaker, when the exhaust noise was reduced below that of the propellers by the use of silencers there was practically no difference in noise levels in level flight under power and in a glide at the same air speed with engines throttled

Science News Letter, June 7 1947

ORNITHOLOGY

Juncos Have Caste System Determined by Pecking

➤ IN STUDYING bird behavior, Cornell University ornithologists have discovered a distinct social or "peck" order among the juncos, a variety of small American finches

The "peck" trait means that one bird can peck every other bird in the flock, a second can peck every bird but the first, and so on until there is one bird that can be pecked by all the rest, but is not allowed to return any of the pecks

The studies showed that one bird by fighting could work its way up in the society and peck his superiors The birds with colored feathers, banded for easier identification, showed as much dominance after being marked as before, according to the observations of M J Westfall

Science News Letter June 7 1947

CHEMISTRY

Silicone Oil from Sand Makes Better Rubber Tires

➤BETTER TIRES are obtained when a silicone oil made from sand is used in their making, the American Chemical Society in Cleveland was told by Harry J Collyer and Eli M Dannenberg of Godfrey L Cabot, Inc, Boston

The silicone material is used as a softening oil The rubber prepared with it defies heat, weather, chemicals and abrasion In the manufacturing process it is extruded more rapidly and smoothly Its improved performance is due to its inertness, the scientists said

The silicones, war developed synthetic resins made of sand and organic matter, include lubricating oils and greases Some silicone fluids approach petroleum oils in ability to reduce wear, and silicone greases seem to be suitable for use in ball bearings under severe conditions where long service is essential Several special uses for silicone oils have been found

GR S synthetic rubber, a type widely used for automobile tire treads, when loaded with silicone oil showed remarkable improvement in abrasion resistance, the scientists asserted The oil can be mixed with the carbon black used to strengthen the rubber, or it can be added directly to the compound during processing

Science News Letter June 7 1947

ENGINEERING

Jets Power Future Flying

Jet research holds promise for peacetime air travel Four types of jets are making obsolete the best conventional planes with internal combustion engines

By WATSON DAVIS

▶ THERE'S POWER in roaring flames whether in a windswept forest fire, your oil burner, or a jet plane of the future

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Jets with their simple power are revolutionizing travel through the air — for peaceful transport or for atomic war if we fail in our attempt to get along with the other peoples of the world

Applying jet propulsion to our airplanes is the high priority task for our research laboratories today Already the P 80s, with turbine-jet engines, have made obsolete the best conventional fighter planes with the best internal combustion engines Jet bombers are being flown experimentally Jet transport planes are on the drawing boards

The reciprocating, spark-fired internal combustion engine feeding on gasoline (look under the hood of your automobile to see one) has a rival that may drive it out of the air

Four Types of Jets

There are four different types of jet propulsion units

The turbo jet and turbo propeller jet engines, which operate through the principle of the gas turbine

The pulse jet, used by the Germans as the propulsion unit of the V 1 "buzz bomb

The ram jet, currently undergoing rapid development for use on guided missiles or other highspeed transportation

The rocket, most highly developed in the German V 2 weapon

Only the turbo jet and turbo prop jet engines rely upon gas turbine driven compressors to compress the intake air The pulse jet and the ram jet use oxygen of the air for burning their fuel, but compress the air by their speed The rocket supplies its own oxygen and thus can go outside the atmosphere

The principle of the combustion gas turbine is not new, but it makes possible the development of turbo jet and turbo prop jet engines for aircraft The future of marine and railroad locomotive propulsion will feel its impact History is full of attempts to develop a satisfactory gas turbine Early experimenters were unsuccessful They were handicapped both by lack of knowledge which would permit design of efficient compressors and turbines, and by lack of the proper materials of construction

War Spurred Research

The wartime need for greater and greater speed in aircraft prompted intensive research that before and during the war increased our knowledge of aerodynamics Metals were devised that would stand up for extremely high temperatures This made possible the development of the gas turbine, in the form of the turbo jet engine, for aircraft This new type of engine is one of the outstanding developments since the Wrights flew the first heavier-than air machines

The design of the combustion gas turbine is simple There is only one major moving part, a rotating shaft on which is mounted an air compressor and a turbine rotor The compressor supplies air to the combustion chambers where fuel is burned continuously to increase the energy content of the compressed air by heating it The resulting hot gases are then expanded through a turbine The turbine rotor and shaft revolve In the case of the turbo jet engine, only sufficient energy is recovered by the turbine to drive the compressor, and the hot gases leaving the turbine are exhausted through nozzles to form the jet The reaction to the jet propels the aircraft as a result of the increase in momentum of the air stream due to its rise in temperature and volume as it passes through the unit

In the prop jet engine, the greater part of the energy available in the hot gases from the combustion chamber is recovered by the turbine The power thus available, over and above that required to drive the compressor is utilized to drive an air screw propeller, in the case of high speed aircraft

Great amounts of fuel and air consumed by the gas turbine engine in developing its great power are astounding Philetus H Holt, a research director of the Standard Oil Development Co, has figured that a turbo-jet engine developing 4,000 pounds thrust, equivalent to 4,000 horsepower at 375 miles per hour, will require more than 4,000,000 cubic feet of air in an hour At this rate, all the air in a typical six-room house would be exhausted in about nine seconds Approximately 20 barrels of fuel are burned each hour—enough fuel, if it were gasoline, to drive an automobile 12,000 miles at a speed of 60 miles per hour, or, if heating oil, enough to heat a typical six room house for two thirds of a heating season

Heat is released in the combustion chambers of the turbo jet engine at the rate of about 20,000,000 Btu per hour per cubic foot of combustion zone, which may be compared with a rate of one to two million Btu per hour per cubic foot in the case of industrial furnaces This great development of power is accomplished with a freedom from vibration unknown in reciprocating engines

High-Speed Engine

Where fuel economy is of secondary importance, the turbo jet engine far surpasses the conventional reciprocating engine when high speed at present altitudes is necessary, as is the case in fighters, interceptors and fast attack bombers When pressurized cabins are used combined with turbo jet power at very high altitude, fast, long range commercial transports will be attractive to airlines At altitudes of 40,000 feet or higher the turbo jet unit is much more economical of fuel than at low altitudes

Long flights of 3,000 miles, which presently take 12 to 14 hours, will be made in six to seven hours Equipment and pilots will do double jobs, passengers will get there faster

The turbo propeller jet power plant has the possibility of competing directly with the conventional reciprocating engine at present day speeds, since improvements in design should soon give fuel economy and operating life equivalent to those of the reciprocating engine

How soon will your airlines ticket give you such flight? Some estimate they will come in three years, others in five years and others still 10 years or longer The rapidity of their introduction, say the engineers, will be in direct proportion to the amount and calibre of the effort expended in research and development

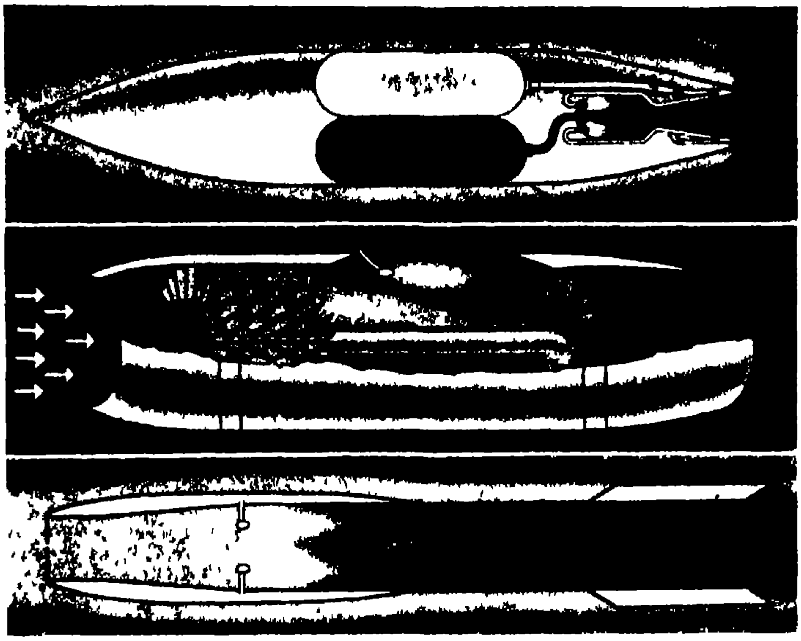
Turbo jets will do their job at double the speeds of present airlines, but aviation will turn to the ram jet to surpass the speed of sound

Speeds twice the speed of sound, some 1400 miles per hour, have been achieved for short flights by the 'flying stove pipe"

Jap Kamikaze 'suicide' planes sparked the post-haste development of the ram jet to power the Navy's Bumblebee anti aircraft weapon that would have been shooting them down if the war had lasted

The ram jet idea is not new, although, like other modern jet engines, it is 20th century in its conception Rene Lorin, a Frenchman, proposed in 1908 the use of the internal combustion engine exhaust for jet propulsion, and in his scheme the engine did not produce power in any other way Five years later he described a jet engine where the air was compressed solely by the velocity, or ram effect of the entering air This is the ram-jet

The nickname of the ram jet, 'flying stove pipe,' describes what it looks like



JET POWER—Carrying both fuel and oxygen (shown in the white and dark compartments respectively, top), rockets do not depend upon the earth's atmosphere for combustion of the fuel The turbo-jet exhaust (center) supplies reaction power for the jet-propulsion With both rotating and stationary blades at the back of the engine, the exhaust turbine operates the air compressor with similar blades but at the front of the engine Air is rammed through the nose of the ram-jet (bottom), heated by flaming fuel and discharged through the tail

It is a cylindrical duct, with a varying diameter The air enters through a tapered nosepiece and it comes in at a speed above that of sound The ram jet is only efficient when it goes through the air at speeds higher than the speed of sound, which is about 700 miles per hour In the military version of the ram jet, it is launched and brought up to speed by rockets which soon burn themselves out and give way to the ram jet itself

Air entering the tube when the ram jet is in flight is slowed down to below the speed of sound The air mixes with the fuel The very simple device for doing this is at present one of the secrets in the ram jet, as applied to an anti aircraft weapon The diffuser in the air duct stabilizes the flame and the combustion of the gases increases very rapidly through the duct Just to the rear of the ram jet the gases attain a speed of up to 2 000 miles per hour

When supersonic transportation of mail, express and ultimately passengers is contemplated, the ram jet offers a

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motor of great promise The present military development of this device is by commercial and industrial agencies, under sponsorship of the Bureau of Ordnance of the Navy, with the coordination of the Applied Physics Laboratory of the John Hopkins University This development may influence peacetime transportation of the future world

In the future, liquid fuels that are produced from petroleum will be made to fit the requirements of jet engines Particular fuel requirements for the turbo jet engine may even bring kerosene and other distillates heavier than gasoline back into prominence

During the war some of the jet planes were designed to burn kerosene while other jet devices operated on hundred octane gasoline Such high octane gasoline was not actually necessary but due to the fact that much of the aviation fuel in the war areas was high octane, it was used to simplify the problem of supply

If jet planes were used in another war emergency, a fifth of the U S petroleum refining capacity would be used for making jet fuels, Robert P Russell, president of the Standard Oil Development Co, estimated recently Designing of fuel that can be used in a variety of jet motors is as important as designing jet motors themselves Military specifications are now being considered that will cause more of the fractions of petroleum to be used in making jet fuel This may prove to be one of the most important decisions affecting flying power for the future

Science News Letter June 7 1947

• Books of the Week •

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AMERICAN AVIATION DIRECTORY —Spring and Summer 1947— Wayne W Parrish, ed,—*Am Aviation Assoc*, 620 p, paper, $5 Aviation officials and companies of the United States, Canada, Latin America, Africa, Europe, and Australasia

BRASSEY'S NAVAL ANNUAL 1946—H G Thursfield—*Macmillan*, 282 p, illus, $6 A record of the peak strength of wartime navies of U S and Great Britain as well as an analysis of their present state and losses sustained

THE DOCTOR RECOMMENDS—C O Young —*Wetzel*, 319 p, $2 50 This story of the history of some phases of medicine reads like a novel, with some history for background it deals with medical advances in one doctor s lifetime

ESTIMATION OF THE VITAMINS, Biological *Symposia* Vol XII—W J Dann and G Howard Satterfield, eds—*Ronald Press*, 531 p, $6 50 A careful presentation of the several methods of vitamin assay with specific reference to all vitamins in a series of essays by specialists in each field

INVENTIONS AND THEIR MANAGEMENT—A K Berle and L S de Camp—*Int Textbook*, 2nd ed, 742 p, illus, $6 The principles and practices governing the technical, legal and business procedures of invention

LIFE THROUGH THE AGES, A Visual Introduction to the Story of Change in Living Things—R Will Burnett—*Stanford Univ Press*, 47 p, illus, paper, $1 This story of the development of the world traces the ages of prehistoric time with their accompanying flora and fauna illustrated the changes in the earth through the tremendous forces of gravity and temperature, and man s advent upon this scene

MAKING THE PEACE TREATIES 1941-1947 —Dept of State—*Govt Printing Office* State Publ 2774, 150 p, paper, 50 cents Beginning with the Atlantic Charter, this history of attempts at agreement on peacemaking is of present day significance

MILK AND FOOD SANITATION PRACTISE—H S Adams—*Commonwealth Fund*, 303 p, illus, $3 25 A practical text presenting the essential fundamental principles of sanitary supervision of milk and food supplies and how to accomplish them

NATURAL PERFUME MATERIALS—Y R Naves and G Mazuyer—*Reinhold*, 338 p, illus, $6 75 Translated by E Sagarin, this book presents fundamental knowledge concerning material extraction by digestion, enfleurage and volatile solvents

ONE HUNDRED DERMATOLOGIC FORMULAS —Herman Goodman—*Froben*, 62 p, paper, $2 Prescriptions for the treatment of common skin diseases

THE PERSONALITY OF ANIMALS—H Munro FOX—*Penguin*, 116 p, illus, paper, 25 cents A discussion of the development of the senses of animals and their various degrees of intelligence

RABIES AND ITS CONTROL—Committee on Animal Health—*Natl Res Council*, Circular 126, 12 p, paper, 25 cents The sixth report of this committee

RELATIVITY THE SPECIAL AND GENERAL THEORY — Albert Einstein — *Hartsdale House*, 168 p, $2 50 Published in 1920, this simplified explanation of the theory of relativity somehow passed unnoticed

SCIENCE IN FARMING THE YEARBOOK OF AGRICULTURE 1943 1947—U S Dept of Agriculture,—*Govt Printing*, 944 p illus, $2 Prepared for farmers, this account of new developments in farm science is both practical and specific and offers a background for the understanding of future research

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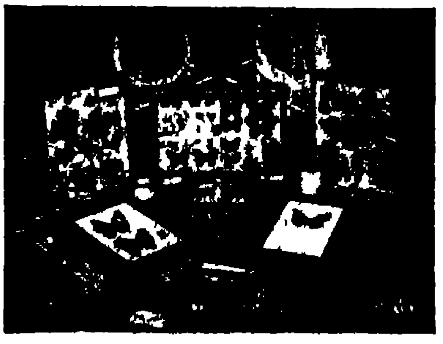

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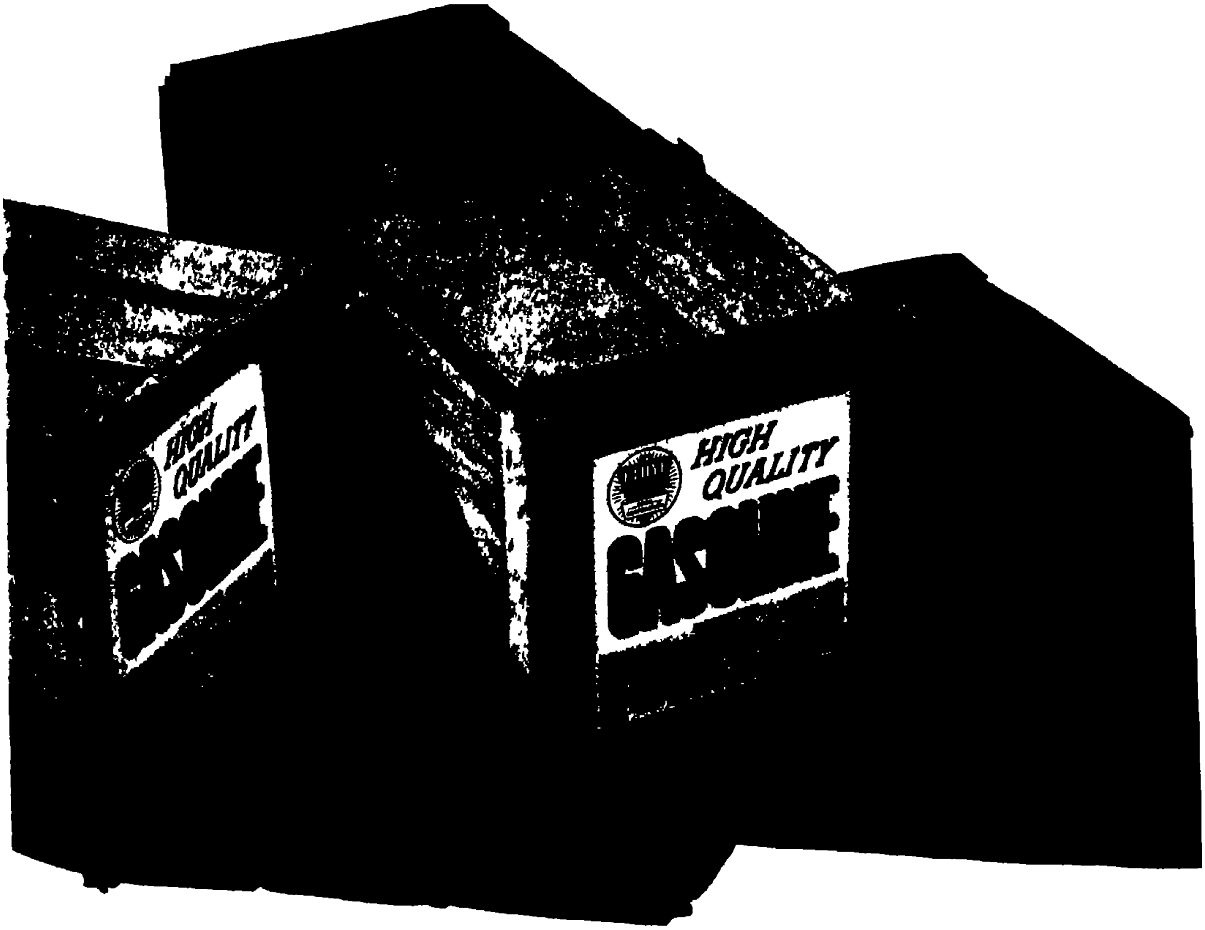

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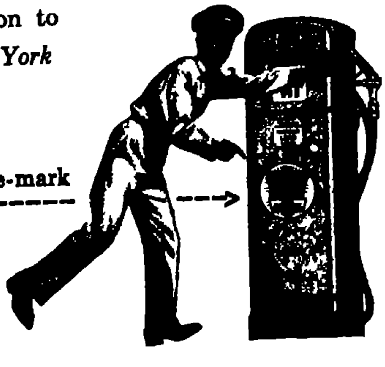

BOTANY

NATURE RAMBLINGS

by Frank Thone

Colonizers of Barren Lands

➤ WIND BEATEN, sun baked rocks in the driest deserts, bare bones of granite sticking out of mountainsides, glacier-dropped boulders on Arctic islands, volcanic lavas with their fires all spent, even tombstones in old churchyards—these would hardly seem promising places to go botanizing. Yet all of them will yield at least a thin harvest, if you know how to hunt for it.

You must not expect roses and orchids, of course, or even cacti and yuccas at the outset. Indeed, unless some botanist has shown you what to look for, you'll take these exiguous gardens of the rocks for part of the rocks themselves, or at best for chance splashes of paint. For these first-fruits of the dead stone are mere films of life—and of life that can "play dead", at need, for long periods of droughty time.

These first colonists of earth's barest places are the lichens. A lichen is not a plant, in the sense that a fern or a violet is a plant; it is really a colony of plants—and of two diverse kinds of plants at that. Under the microscope, the structure of a lichen is seen to consist of a close network of fungus threads, enclosing numbers of lowly one-celled green plants known as algae.

Fungi, being unable to manufacture their own food, have to depend on the carbohydrates and proteins prepared by the algal cells. It is assumed that the algae get some benefit from the arrangement, in the way of protection, and perhaps from the wick-like water-holding action of the fungi. Such a mutually advantageous arrangement in nature is called *symbiosis*, which is a Greek phrase meaning "living together." To a perhaps somewhat jaundiced eye, it looks as if the algae in a lichen complex were getting the worse of the bargain; their role appears to be like that of the helots in ancient Sparta, or of the "natives" in a nineteenth century European colony in the tropics. However, even in a slave state there are a few small advantages to the slaves, unless their exploiters are greedy to the point of self-destructiveness.

There are three general classes of algae: crustose, which are the paint-splash like kinds, impossible to collect except by chiseling loose chips of the rock; foliose or leaflike, which form loose, leathery or papery scales, easily picked up; and fruticose or twiggy, of which the best known examples are the so-called reindeer moss of northern lands and the beard moss that drapes tree boughs wherever the climate is damp and cool.

Science News Letter, June 7, 1947

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CITY & STATE

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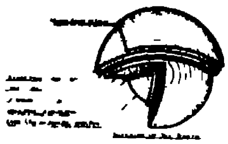

Atoms, Planets & Stars

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✿ *STATIC-REDUCING powder, that can be blown into automobile inner tubes, lessens or eliminates the electrical shock that sometimes occurs when a car is touched and also the electrical interference with radio reception The powder clings to the walls of the tube and changes the electrical behavior of the tires*

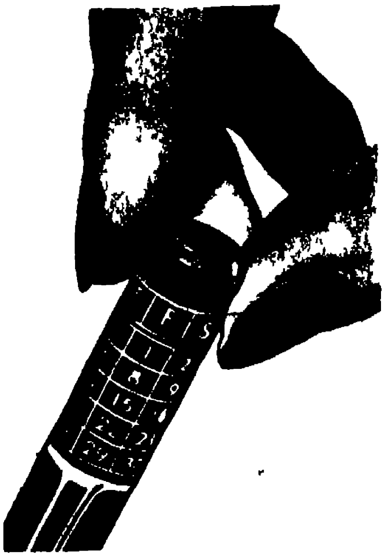
Science News Letter June 7 1947

✿ *SANDWICH SHOPS, measuring 24 by 10 feet are shipped from factory by railroad car or trailer completely assembled ready to set on a foundation They are made of stainless steel and aluminum and are largely welded construction Necessary fixed equipment is included*

Science News Letter June 7 1947

✿ *ONE POUND BATTERY, a 300-volt dry cell has been developed for use with the Geiger counter an instrument for measuring radioactivity in ores, or materials near the site of an atomic explosion The new battery makes the counter independent of power lines Its concentrated power is possible because of its flat-cell construction*

Science News Letter June 7 1947



✿ *CALENDAR PENCIL has an adjustable top, shown grasped by the fingers in the picture, that can be rotated so that the letters representing the days of the week can be fixed over the proper columns of figures to form the calendar for any month The top is reset for each new month*

Science News Letter June 7 1947

✿ *EYE TESTING equipment for rating the eyesight of industrial workers, detects suppression of vision in one eye perception of depth, color blindness visual sharpness, and tendency toward cross-eyedness It is a simple device, that rests on an ordinary desk, with visors that fit over the eyes being tested*

Science News Letter June 7 1947

✿ *SELF LOCKING nut, of the wing type for easy turning, is featured by an elastic nylon collar which helps hold the nut in position It is designed for use on household appliances, and with garden, office and industrial equipment*

Science News Letter June 7 1947

✿ *KNIFE SHARPENER, for table use in the home, has three upright honing surfaces of alundum fixed in an ornamental plastic base easily grasped by the hand to hold it in place Two hones are stationary The center one, facing the other two, is on a spring arm which is pushed back to allow the entry of the blade*

Science News Letter June 7, 1947

Question Box

AERONAUTICS

What will be the characteristics of the flying automobile? p 357

Why are plastics increasingly used in aircraft? p 356

AGRICULTURE

How do munitions cause hunger? p 358

BOTANY

What is a lichen? p 366

CHEMISTRY

How do cosmic rays create radioactive carbon? p 355

How is silicone oil used in making rubber tires? p 361

Why is carbon tetrachloride not an ideal fire extinguisher? p 360

ENGINEERING

How does the turbo jet engine surpass the reciprocating engine? p 362

MEDICINE

What are the new drugs that relieve heart and circulation disorders and asthma? p 359

NUCLEAR PHYSICS

Does more energy come from fission or fusion of atoms? p 358

ORNITHOLOGY

How is the caste system of juncos determined? p 361

RADIOPHOTOGRAPHY

How will the U S Navy keep up with weather conditions all along the Pacific? p 361

Pictures *Cover, Todd Shipyards Corporation, General Electric, p 355, Parker Appliance Co, p 357, Westinghouse Corp, p 359; Standard Oil Co, p 363*

Where published sources are used they are cited

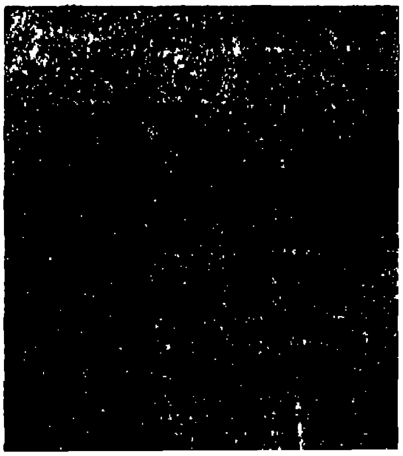
★ SCIENCE SERVICE BOOK SELECTION

ON UNDERSTANDING SCIENCE

by James B. Conant

Heralded as a revolutionary development in American education, this is the book about understanding the laboratory and its effect on modern living Harvard's president here presents in clear readable terms an historical view of great scientists of the past, and their concepts of science What did their generations know of the world about them? What were the problems they set out to examine—and the solutions they found? Mr Conant's book assists the reader in a new approach to the scientific method in operation $2 00 142 p illus

This book is one of those chosen from time to time by Science Service for the convenience of its readers, as an outstanding work in it's field



15

SCIENCE NEWS LETTER

A SCIENCE SERVICE PUBLICATION

The two filters in the picture (one with side cut away) are used to separate two radio channels coming in on the same antenna but on different frequencies At the end of the connecting waveguide the channels are made to part company each going to a different circuit through its assigned filter

SEPARATION CENTER

FOR RADIO WAVES

Thirty years ago, when all telephone service went by wire, Bell scientists developed means of sending dozens of conversations over the same line

This they did by giving to each conversation a different *carrier frequency,* then to separate it from the others, they used a device which they had invented and named—*the electric wave filter*

Today, in microwave telephone systems, the message-bearing waves pass to and from the antenna in pipes called waveguides So scientists in Bell Laboratories devised a different kind of filter—a filter in a waveguide This filter is a system of electrically resonant cavities formed by walls and partitions Waves that set up sympathetic vibrations in the cavities pass through, others are reflected

In the Bell System, now, single circuits are carrying many conversations at the same time through precision wave-filtering

BELL TELEPHONE LABORATORIES

EXPLORING AND INVENTING, DEVISING AND PERFECTING, FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE

GERIATRICS

Youth Fountain in Brain?

When groups of nerve cells in midbrain are injured by sickness, aging in appearance occurs. Scientists seek relation between disease and old age

➤ SMALL MASSES of nerve cells in the midbrain may hold a clue to the Fountain of Youth When these groups of nerve cells are injured by sickness, as in "sleeping sickness," a look of advanced old age comes even to quite young persons Perhaps further study of these cells and of the effects of sickness on other cells in the body may lead to extending life to 'unlimited periods"

These suggestions appear in a report by Dr S Philip Goodhart, professor of clinical neurology at Columbia University, to the American Geriatrics Society in Atlantic City

For examples he drew from a study of a large group of patients in which the disease process was chiefly in the basal ganglia These are the small masses of groups of nerve cells within the midbrain They mediate important vital functions of the body Among these are the mechanism of blood circulation, the action of the heart, digestion, and the walls of the arteries Here, too, Dr Goodhart pointed out, are the centers closely integrated with the emotions There is anatomical and physiological relationship between these cells and the higher controlling centers within the brain cortex

Among the patients studied was a young woman, once graceful and comely She emerged from an attack of epidemic encephalitis or so called sleeping sickness, as a much older woman with features changed and a face almost hideous in its expression Her figure also had changed its contours

Two other victims of this disease rapidly developed tremors and expressions of advanced age, "as though a few months had wrought the changes of years"

"Are the changes of advancing years from birth to old age expressions of disease?" Dr Goodhart asked his medical audience 'Is there reason to look with hope that as Science develops means to prevent disease or builds up immunity, life may extend to unlimited periods?'

Science News Letter June 14 1947

RAIL ROBOT—Powerful electric generator will feed 1,500 horsepower of energy to a diesel-electric locomotive's driving motors In larger locomotives, two or more of these generators are operated together.

MEDICINE

New Flu Vaccine for Army

A new strain of influenza virus appeared in the last epidemic and vaccine is being developed to protect against it. Promise of anti-flu drug seen.

THE ARMY will probably have a new, better vaccine against influenza next fall And before too long, all of us may be able to get a specific drug for treatment if we get 'flu

These possibilities appear in a report made by Dr Joseph E Smadel, scientific director of the virus and rickettsial diseases department at the Army Medical Center, Walter Reed Hospital

Reason for the new influenza vaccine is that a new strain of influenza A virus appeared during the 1947 epidemic It was so different from the older strains of influenza A that the present vaccine, in some cases at least, could not protect against it The present vaccine is effective against the older strain of influenza A and against a strain of influenza B virus

Linlithgow Library

The Army's epidemiological board has just recommended that the new strain be incorporated with the older strain and the B virus, in vaccine purchased by the Army for use in the fall of 1947

For treatment of influenza, Dr Smadel pointed to two drugs that check the growth of the virus when it is growing on eggs in the laboratory One of these is an acridine, related to the anti-malaria drug, atabrine Although the growth of the virus is considerably delayed at first at the end of 72 hours it was growing as well in the acridine treated eggs as in untreated controls

"Such data as these are not sufficiently exciting to warrant immediate clinical trials of this drug in the treatment of influenza," Dr Smadel said "The data do hold promise that a satisfactory drug may be found"

"Candy coating the flu virus by such sugary materials as apple pectin and blood group A substances also checks its growth in eggs This was reported last month by scientists of the Rockefeller Institute The candy coated virus particles, Dr Smadel explained, seem unable to enter the body cells to cause infection, while the acridine drug probably prevents virus growth by interfering with processes in the body cells essential for multiplication of the virus once it has gotten into them

Science News Letter June 14 1947

PHYSICS

Oil Recovery from Wells

➤ TO SPEED the recovery of oil from sluggish wells, Ralph M Steffen of North Hollywood, Calif, explodes carbureted gases in a cylinder, and pumps them down the well while still flaming hot The heat reduces the viscosity of the oil, and the pressure substitutes for the lost natural gas pressure Patent 2,421,528 was granted on this idea

Science News Letter June 14 1947

MEDICINE

Blackouts Not Damaging

➤ PILOTS who "blacked-out" frequently during dive bombings or other combat flight maneuvers need not worry that they will suffer any lasting damage from the experience Evidence for this reassurance comes from studies reported by Drs E H Wood, E H Lambert and C F Code, of the Mayo Aero Medical Unit at the meeting in Atlantic City of the Aero Medical Association

In the process of developing means of protecting pilots against blackout, many of the personnel of aero medical laboratories repeatedly acted as subjects during tests on the human centrifuge and in aircraft They often lost vision, that is, had a "blackout," during such tests and sometimes were made unconscious and were out completely

Up to the present, they have developed no apparent permanent or cumulative effects from these experiences, although they probably have experienced more blackouts than a fighter or dive bomber pilot or test pilot would experience in a lifetime

Some of those who took part in the tests have undergone more than a thousand 15 second exposures to centrifugal forces ranging from two and one half to nine times the force of gravity

Some were exposed to forces of over two and one half times gravity for a total accumulated time of more than five hours and to forces above six times gravity for more than 40 minutes

Some had partial or complete blackouts more than 800 times in the three year period from 1942 to 1945

The blood pressure at the level of the head was reduced in some of the test personnel, it is estimated, to less than half the normal on more than 300 occasions and to zero on more than 70 occasions

Although these reductions in blood pressure lasted less than 15 seconds, one person had the experience often enough so that the total accumulated time at which his blood pressure was one half of normal was more than 50 minutes For an accumulated time of more than 15 minutes he had the blood pressure in his head reduced to zero

Science News Letter June 14 1947

NUTRITION

Food Likes Important

➤ PILOTS and crews of combat planes want candy, chocolate, cigarettes and chewing gum for flight rations, regardless of what nutritionists think of such a diet And the fliers want fried eggs for breakfast before taking off on their dangerous missions, even though scientific studies showed that cereal and toast for breakfast raises their ceiling 2000 feet

These food likes, and their importance, were reported by Dr David B Dill, scientific director of the Army Chemical Center's medical division, at the meeting in Atlantic City of the Aero Medical Association

War dogs in action on Moretai ate, thrived and carried out their missions with great success on an old C ration type of diet, consisting solely of meat and vegetable stew and hash But soldiers and air men refused these rations after a few days, even when there was nothing else to eat

Which goes to show, Dr Dill stressed, that a good ration for a soldier cannot be planned on the basis of feeding experiments with animals in a laboratory

Quartermaster Corps scientists planning rations for any future wars might well follow the example of "that unsurpassed observer of soldiers in action, Ernie Pyle," Dr Dill suggested, and get out in the field to see what combat soldiers want to eat

"A few observations on men under combat conditions may be more valuable," he said, "than hundreds of observations on test subjects who have not been at war or thousands of observations on rats"

Planning civilian diets for good nutrition, he suggested, also will be more successful if made on men at work as well as on rats in the laboratory

Science News Letter, June 14, 1947

MEDICINE

Less Proficiency Causes Plane Accidents in Pairs

➤ AIRCRAFT accidents do come in pairs, if not in threes, Dr Daniel Horn, of the flying safety division of the Field Office of the Air Inspector, Langley Field, reported at the meeting in Atlantic City of the Aero Medical Association

There is nothing mysterious about the repeated accidents An accident is followed by a period when the pilot's proficiency is temporarily impaired, it seems from Dr Horn's studies These concerned the time interval between successive aircraft accidents for over 9,000 repeater pilots in the AAF

The study showed that a second accident tends to follow quickly on the heels of the first, whether or not pilot error was involved in the first accident

The old flying custom of sending a man up again as soon as possible after he has crashed would seem to need revision on the basis of these studies

Science News Letter June 14 1947

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FOOD TECHNOLOGY

Soybean Protein Whipped

Extracted after oil has been removed, these proteins make excellent whipping compounds. Other reports from the Institute of Food Technology are given

➤THE SOYBEAN, versatile gift of Orient to Occident, has found yet another job in its adopted home in the West. Soybean proteins, extracted after the oil has been taken out, make superior whipping compounds, Dr. Ralph M. Bohn, Minneapolis food chemist, stated before the meeting of the Institute of Food Technologists in Boston. Whipping compounds include such things as meringues, marshmallows, nougats, and other kinds of "sweetened air" that play highly important roles in the pastry and confectionery trades. The new soybean products will capture more air quicker and hold it longer than either egg white or gelatin, the speaker pointed out.

Storing Dried Egg White

Dried egg white, used by tons in making baked goods, tends to deteriorate in storage because it contains a certain amount of sugar, John C. Ayres and George F. Stewart of Iowa State College told the meeting. This undesirable sugar can be eliminated by fermentation with ordinary yeast, which is added along with a small quantity of yeast extract. By careful control of the fermentation process, the substance called mucin, essential for good results with egg white can be retained.

Research on Packaging

Packaged food products can be kept from spoiling longer by treating the wrapping material, or even the paper-pulp out of which it is made, with fungicides, antibiotics and antioxidants, according to the requirements of the particular product, Dr. Louis C. Barail of the U. S. Testing Company, Hoboken, N. J., stated. He regards as ideal a group of new synthetic wrapping plastics known collectively as Vyncote, because they are "inert, non-toxic, tasteless, non-inflammable, and capable of being treated with germicides, fungicides and insecticides."

Fish Byproduct Uses

Non-edible byproducts of fish have a wide range of industrial and other uses, Dr. H. L. A. Tarr of the Fisheries Research Board of Canada told the meeting. Uses in such things as fertilizer and chicken feed are so well known as to be commonplace; less familiar, perhaps, is their usefulness to makers of linoleum and plastics, as well as in leather preparation. Vitamins from fish livers are an old story, but the pharmaceutical industry is also drawing on fish for insulin, the protamin used with insulin, and the anti-pernicious anemia factor.

Science News Letter, June 14, 1947

MEDICINE

Adrenal Glands Found To Produce Fat Hormone

➤ DISCOVERY of a new fat hormone produced by the adrenal glands was announced at the meeting in Atlantic City by Drs. Frank A. Hartman, Katherine A. Brownell and Jonathan S. Thatcher of Ohio State University.

The adrenal glands, located just above the kidneys, are most familiar to the layman through another of their hormones, adrenalin or epinephrine, sometimes dramatically used as a stimulant to dying patients and also commonly used to relieve acute asthma attacks.

Besides adrenalin these small glands produce at least one other vital hormone, a chemical generally referred to as cortin. Lack of this hormone results in Addison's disease in which the patient's skin is a gray bronze color and which was always fatal until the discovery of cortin.

The new fat hormone from these same glands is responsible for moving fat from the reserves of the liver during starvation, the Ohio State scientists found. When given to laboratory animals from which the adrenal glands had been removed, it caused fat to be deposited in their livers even when they were starving.

Science News Letter, June 14, 1947

AERONAUTICS

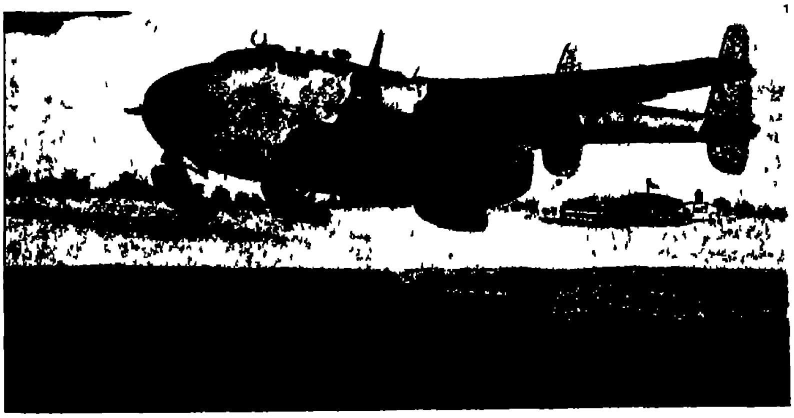
Inflated "Doughnuts" Make Landing on Water Possible

See Front Cover

➤ HELICOPTERS can now land on water or marshy ground by means of newly developed landing gears attached to each of the three landing wheels. Tests made by the U. S. Coast Guard at Elizabeth City, N. C., showed these gears that are really rubber lifeboats to be satisfactory. They look somewhat awkward when blown up but do not interfere with normal landing on ground.

If a helicopter engine should fail over water the flotation gear would make possible a landing instead of a crash.

Science News Letter, June 14, 1947



TRACK LANDING GEAR—This landing gear, similar to the tractor tread used on tractors and tanks, is being built for the Fairchild C-82 Packet.

RADIO

Printed Wire for Radios

Commercial application of this wartime research is about to become a reality. Flat lines for easy production are development from proximity fuze.

➤ FIRST COMMERCIAL application of the revolutionary wartime development, printed wire, may soon find its way into new radios

The flat, printed lines, which take the place of the complicated copper wires in your own radio, are now being used to form small, rugged interstage coupling plates These plates connect the amplifying tubes of a radio

Printed wire plates are being manufactured by the Centralab division of Globe-Union, Inc , Milwaukee, Wis This firm produced printed wire circuits for the proximity fuze At least one large radio manufacturer is understood to be planning to use the printed wire plates in home radios

Claimed to be the first commercial application of printed wire, the coupling plates have only four soldering connections, compared with nine in standard wiring, and are smaller units, more easily incorporated in radios

Printed wire is formed on a flat surface with a solution which dries to form lines These lines are composed of silver in place of copper wires, and carbon is used for resistors in printed wire electronic circuits Advantages claimed for printed wire are rapid, comparatively easy production, smallness of size and rugged construction, compared with wiring

Printed wire was developed late in the war for use in some of the models of the proximity fuze Since the war, scientists at the National Bureau of Standards have developed the "lipstick broadcasting station, the "calling card radio' and other tiny equipment utilizing printed wire, but the coupling plates are the first product to come on the market

Meanwhile, scientists at the Bureau of Standards fear that America may be lagging behind the British in developing applications of printed wire Sargrove, Ltd, of London, is reported to have produced an assembly line type machine for turning out printed wire circuits

Latest American achievement with printed wire is a complete radio transmitter smaller than a pack of cigarettes The broadcasting unit is seven eighths of an inch by two inches by two and one fourth inches The tiny radio station was developed by Dr Cledo Brunetti and his associates in the Ordnance Development Division of the Bureau of Standards

Two thirds of the midget station s size is due to batteries Dr Brunetti predicts even smaller batteries may be developed The lipstick broadcasting unit, developed by Dr Brunetti's group, had lines painted on the tube to replace wires, but it required separate batteries

Dr Brunetti reports that his office has received many reports from manufacturers working on printed wire developments After components for radios, such as the coupling plates, he believes a personal radio with a broadcasting and receiving station, small enough for a coat pocket or handbag, will be put on the market

Science News Letter June 14 1947

EVOLUTION

Man Owes Civilization To Adaptibility of Mind

➤ MAN IS MAN because he is plastic — mentally

Man owes his distinctive place in the world, his separation from all his animal kindred, to his inheritance of an adaptive mental pattern Human beings do not have to respond to a situation in a rigidly predetermined way, as bees, wasps and ants do

Dr Th Dobzhansky of Columbia University and Dr M F Ashley Montagu of Hahnemann Medical College in Philadelphia explain this plasticity in human behavior in *Science* (June 6)

Man solves problems of life never before experienced This ability is tied in with man's highly developed nervous system, and especially with his big brain Organisms with "one track" behavior patterns have far less complex nervous systems, the two scientists state

Big brains came early in human development Beetle browed Neanderthal man had a brain somewhat larger than modern man's, though differently shaped But more important than size or shape of brain is what can be done with this equipment The two scientists point to the well-worked flint tools of half a million years ago which are specialized types intended for different jobs They are evidence that the distinctively human trait of mental plasticity had already been well developed

The scientists see no reason in man's evolution why various human races can t think the same way

Just because different races have different skin colors and other structural traits that are not the same, Drs Dobzhansky and Montagu contend that "it does not necessarily follow that they must also differ in mental ones"

Science News Letter June 14 1947

METEOROLOGY

Radio Waves to Give Facts About Air Masses Overhead

➤ RADIO WAVES may some day become probes used by weathermen in finding out what kinds of air masses are overhead and roundabout From knowledge thus gained, they may be able to give more accurate forecasts of what's coming up next

Newest thing in this field is the subject of U S patent 2,421,730, issued to Gilbert S Wickizer of Riverhead, N Y , and assigned by him to the Radio Corporation of America Mr Wickizer uses radio waves of high frequency—300 000 kilocycles and upward—sending them from stations at known distances apart, with the receiving station on a tall tower or even on a mountain

High frequency radio waves, of the so called pseudo optical group, are affected in their range primarily by the refractive qualities of the lower atmosphere, just as visible light waves are Therefore by studying their signal strength on reception, Mr Wickizer states, it will be possible to obtain data on the relative humidity, temperature and pressure gradients of the intervening air masses

Some work in this field was done experimentally during the war by Army aerologists, but not all of their results have yet been made public

Studies on the relations between lower-frequency radio waves and meteorological conditions have been under way for several years at the Blue Hill observatory of Harvard University, under the direction of Dr Harlan T Stetson

Science News Letter, June 14 1947

MEDICINE

Relief for Polio Symptoms

Local anesthetic injected into nerves along the spinal column improves the condition of clammy, swollen feet and hands of adult patients.

➤ A NEW, SUCCESSFUL treatment for some symptoms of infantile paralysis is announced by three Army medical officers at the Army and Navy General Hospital at Hot Springs, Ark The officers are Maj Vincent J Collins, Lieut William L Foster and Capt William J West

The treatment is not a cure for polio It was devised to relieve the blue, cold, clammy and swollen feet and hands of grownup patients recovering from infantile paralysis Infantile paralysis, they point out, can no longer be considered unusual in grown persons They quote one authority as stating that the number of cases in grownups is definitely increasing At the Hot Springs Army and Navy Hospital, a center for poliomyelitis patients 131 cases in military personnel were studied

Muscle spasm and tenderness were also relieved by the new treatment, although it was not devised for this purpose The finding that it relieved muscle spasm was unexpected, but the relief was so definite and sharp that the Army doctors suggest using the treatment also in the acute stage of the disease One patient got relief although treatment with hot packs had brought only "mild comfort"

The treatment consists of injections of a local anesthetic solution into nerves along the spinal column The procedure is known technically as paravertebral sympathetic block It is not unlike the nerve cutting operation used in some cases of high blood pressure and which has also been used in some cases of infantile paralysis But the Army doctors use a chemical, the anesthetic solution, to cut the nerve connections

The nerves selected are those which control contraction and dilation of the small blood vessels in the arm or foot affected with chilblains and the other symptoms Apparently these nerves are affected by infantile paralysis, although the amount of paralysis does not run parallel to the effect on the blood vessels When the nerves controlling the blood vessels are affected, blood circulation is poor and the feet or hands get cold, clammy, blue and swollen

The change in circulation usually occurs within five or 10 minutes after the chemical is injected Many patients experienced a "hot foot" and said, "I can't remember when my foot felt so good"

One patient with weakness, tenderness and spasm of the biceps and triceps muscle of his right arm said after the treatment, "My right arm is now better than my left"

The dropsy swelling cleared up slowly in all cases Three patients, however, said that on the day following the nerve block treatments they could get into a slipper easily

Patients have continued to be relieved of the poor circulation symptoms for as long as six months after the treatment If they have a severe relapse, the treatment can be given again

The treatment could also be given to children, the Army doctors believe although it would be more difficult because it is necessary to have complete cooperation of the patient to do the block successfully

Details of the new treatment are reported in the *New England Journal of Medicine* (May 8)

Science News Letter June 14 1947

ENGINEERING

New Auto Engine Uses One-Third Less Gasoline

➤ ONE THIRD less gasoline is used by a new automobile engine than in present types, it was revealed to the Society of Automotive Engineers by Charles F Kettering, research chief of General Motors Its installation in cars will keep step with the development of new fuels

It is a high compression engine, with cylinder pressure reaching 1,200 pounds per square inch Present engines run at only 600 pounds per square inch Automobiles with the new high-compression engines, operating since last November, are giving 33% to 40% higher economy than ordinary automobile power plants

FIRE STOP—Gases and fumes from fires are sucked out through ducts, such as the one the operator is adjusting, by an exhaust fan Sprinklers surround the ducts to cool the air and help block passage of smoke into the stair opening.

But these high compression engines and fuel developments are in the laboratory stage, he said How soon they can be incorporated into the automobile will depend upon a large amount of development by both the automobile and the petroleum industries working together toward a common goal Doubling the compression ratio at one jump cannot be made at once for various reasons There are 30,000,000 vehicles on the road today which do not require high octane gasoline and must be kept running until they wear out

The change over from present engines to very high compression engines can be taken only in steps As the petroleum industry makes an improvement in fuels the automobile industry can supply a higher compression engine to utilize them

The new engine is designed according to rather conventional procedures, Mr Kettering said, except that it is rigid enough to carry the higher loads imposed It weighs no more per horsepower than present stock engines Its compression ratio, 12 5 to one, was chosen because tests with a one-cylinder experimental engine showed that most of the gains in efficiency on this cylinder construction could be obtained at this ratio

Science News Letter, June 14, 1947

PLANT PHYSIOLOGY

Opposed Growth-Control Chemicals in Sugarcane

➤ THERE IS in sugarcane, and apparently in other plants as well, a substance that checks growth as well as a substance that speeds growth Plants thus seem to be in the same situation as Alice in Wonderland, who, it will be recalled, made herself taller by nibbling one side of a mushroom, and shorter by nibbling the other side

Existence of this pair of opposed growth-control substances has been demonstrated by two botanists at the University of Hawaii, Dr Charles J Engard and Avaro H Nakata, who succeeded in extracting them separately by exceedingly careful differential methods They tested their effects on oat seedlings, which are the plant physiologist's guinea pigs for growth control compounds Existence of anti growth as well as growth hormones had been indicated in several earlier researches, the present work definitely establishes the fact

Presumably the growth-inhibiting substance or substances function in establishing a plant's natural size and proportions As a practical matter, hereafter it will be necessary for experimenters to seek out and separate both kinds of substance, where in the past the discovery of a growth-promoting substance only has been considered sufficient

Science News Letter June 14 1947

MEDICINE

Rough Motion, Not Mind, Causes Plane Sickness

➤ IF YOU GET airsick, it is because the air is rough, not because you are frightened about flying or expecting to be sick

Psychological factors may play some part, but not as much as has been claimed for them

This debunking of psychological factors in air or motion sickness came from a professor of psychology, Dr G R Wendt, of the University of Rochester, to the Aero Medical Association meeting in Atlantic City

The character of the motion has a lot to do with whether a person will get sick, Dr Wendt found from studies of persons in an elevator-like cab that was moved up and down in "waves' of different sizes, frequency, form and acceleration

A 32-cycle wave that was really 'rough" and which the people in the cab expected would make them sick did not cause sickness in as many as a 22-cycle wave This was one unexpected finding and one which tended to debunk the psychological factors

The posture of the head had an effect on motion sickness, as did certain drugs

"The view that airsickness is 'all psychological' is a defeatist position," Dr Wendt charged He said that a strong effort should be made to disseminate the evidence that the kind of motion and the state of the body are more important than the state of mind in causing air sickness

Science News Letter June 14 1947

NUCLEAR PHYSICS

Heart of Atom Holds Three Science Mysteries

➤ THE HEART of the atom and its great energy hold three major mysteries for scientists these days They are

1 What holds together the protons and neutrons in the atomic nucleus? (Protons are positively charged and should repel one another)

2 Why are electrons or electrical particles ejected from the atomic heart which does not contain them?

3 Just what is the meson or mesotron? (This particle discovered in cosmic ray studies lives only a few millionths of a second and then probably reverts to an ordinary electron)

Giant high voltage machines are being built to solve these atomic secrets, Dr G W Dunlap, General Electric nucleonics engineer, explained in listing the atomic problems

One of the six kinds of these machines the synchrotron will produce energies running into billions of electron volts (an ordinary X ray machine used in doctor's offices uses a few thousand volts) One synchrotron proposed will reach ten billion

Other atom smashers are Betatron which accelerates electrons to produce high-energy X-rays Cyclotron, best known among atom smashers, which is a sort of merry go round for atomic particles Synchro cyclotron, which can produce almost unlimited energies by applying frequency modulation principles to the input Linear accelerator, which is an "unrolled cyclotron" and for very high voltage could be 100 feet or more long Electrostatic accelerator, also known as the Van de Graaff machine, the pioneer atom smasher

Science News Letter June 14 1947

IN SCIEN

ICHTHYOLOGY

Parasitic Protozoan Causes Fish Disease

➤ A NEW and serious disease that spoils many fish intended for South African markets, and which can be detected by a ghostly glow given off by infected specimens under ultraviolet light, has been studied by Rees Davies and E Beyers of the Low Temperature Laboratory in Cape Town, South Africa Causal organism is a parasitic protozoan, a microscopic one-celled animal that gets into the muscle fibers of the fish and makes the flesh soft and inedible

Science News Letter June 14 1947

AERONAUTICS

Duplex Planes for Cargo And Passengers Discussed

➤ AIR TRANSPORTATION now has growing pains similar to those of railroad traffic decades ago The question is Should passenger planes carry mail, express and freight, or should this "dead" material be hauled exclusively in cargo craft?

Established airlines can handle passengers, mail, express and freight with efficiency and safety, the Society of Automotive Engineers was told by Charles P Graddick, of United Airlines, Chicago This combined traffic would justify the operation of more daily flights, and thereby provide air transportation service otherwise not available to smaller communities

Separate planes for cargo would constitute unnecessary duplication, making traffic and management problems more complicated

"The airlines," he said, "are perfecting interchange arrangements which will permit patrons to ship over any combination of air routes between any two points in the United States '

Airplane service is not comparable with that of truck and bus lines These offer service that can not be duplicated by the railroads Trucks can be loaded anywhere in a city, and unloaded directly at stores or warehouses in other cities They are not confined to fixed terminals as are both railroads and airplanes

Science News Letter June 14 1947

E FIELDS

MEDICINE

Will It Be Boy or Girl Answered By New Tests

➤ PROSPECTIVE parents wondering whether the expected baby will be a boy or a girl no longer need wait nine months for the answer

Some of them will be able to get it much sooner by two new tests announced at the meeting of the Association for the Study of Internal Secretions The tests were developed by Drs H E Nieburgs, H S Kupperman and R B Greenblatt of the University of Georgia School of Medicine

One of them is a chemical test made on the expectant mother's blood The test is for the ratio between two kinds of hormones, chemicals produced by the pituitary gland at the base of the brain, which affect the sex glands One is called FSH hormone, the other LH hormone When the expected baby is going to be a boy, the amount of LH is greatly increased in proportion to the amount of FSH in the mother's blood the Georgia scientists find

The second test is made by staining and studying through a microscope the cells shed by the tissues lining the opening to the uterus, or womb In some cases there are definite types or patterns of these cells Where the types are definite, the Georgia doctors can tell with 85 4% accuracy whether the baby will be a boy or a girl Where the types are not definite, no predictions as to sex can be made

Science News Letter June 14 1947

PLANT PHYSIOLOGY

Chemical Tests Seeds For Ability to Sprout

➤ SEEDS CAN be tested for their ability to sprout by a new chemical method in a tenth of the time required by the old-time germination test The new method, which was further developed in Britain, and is described in *Nature* (May 31) by H J Cottrell of the research laboratories of May and Baker, Ltd

Chemicals belonging to the group known as tetrazolium salts are used in the test They form colorless solutions in water, but when acted upon by the enzymes that are present in germinating seeds change into insoluable red dyes

Representative samples of seeds to be tested are first soaked overnight in water, then split lengthwise so as to expose the embryo or growing point One half of each seed is then placed in a shallow glass dish and just covered with the colorless tetrazolium solution They are left in the dark, at moderately warm temperature, for four hours At the end of that time, seeds of good viability will be stained bright red in the region of their growing parts The area stained differs, of course, from species to species, but any good botanist or agronomist will know where the red should show up if the seed is good

Science News Letter June 14 1947

OCEANOGRAPHY

Corals and Algae Build Atolls Very Slowly

➤ ATOLLS like Bikini are built up by the corals and algae that form them at a rate not more than one tenth of an inch a year, state Dr M C Sargent of the Scripps Institution of Oceanography and T S Austin of the Navy's Hydrographic Office

A chemical test shows whether an atoll is growing or on the downgrade, they add High oxygen content in the water shows that organisms are being born, high phosphorus content indicates decay

Science News Letter June 14 1947

ENGINEERING

Reversing Gas Turbine For Ship Propulsion

➤ A REVERSING gas turbine in which the flow and temperature of the driving gases do not fluctuate during reversal is offered by C R Waller of Trenton, N J, for patent 2,421,445 It is claimed to be peculiarly well adapted for use in ship propulsion Patent rights are assigned to the De Laval Steam Turbine Company

The principle involved is very simple Driving gases are supplied through a ring of nozzles set at an appropriate angle for forward motion There is a second ring, with nozzles pointed at an opposite angle Both rings are movable, so to reverse, the "forward" nozzles are pushed out of the way, and at the same time the "reverse" nozzles are brought to bear The turbine operates at lower efficiency in reverse, but that is a matter of relatively minor importance

Science News Letter June 14 1947

MEDICINE

Alcohol Controls Allergy Of House Ivy Poisoning

➤ SOMETHING different in the way of ivy poisoning came in for discussion at the meeting in Atlantic City of the American College of Allergists

This is skin trouble from house ivy, the plant housewives keep growing in pots or in ornamental jars of water to decorate the living room or sun porch Fortunately, it is a rare condition, not many persons being sensitive, or allergic, to this plant

One case was successfully controlled by treatment with an alcoholic extract made from the house ivy leaves, Dr Samuel E Rynes of Philadelphia reported

The extract, of course, was given by hypodermic injections under the skin, as hay fever victims are desensitized to pollen by injections of pollen extracts

Science News Letter June 14 1947

INDUSTRY

Byproducts Can Cut Cost Of Manufactured Gas

➤ MANUFACTURED gas for cities in the northeastern quarter of the nation may cost less in the future, Alfred R Powell of Koppers Company, Inc, Pittsburgh told the Production and Chemical Committee Conference of the American Gas Institute

Biggest hope for lower gas costs in areas where gas is made from soft coal is from new byproducts and new uses for products obtained in the manufacture of gas The value of the byproducts in making gas from coal is already greater than the return from sale of the gas New uses and new byproducts are the best bet for smaller gas bills, Mr Powell declared

Other factors which can cut the cost of manufactured gas include increased capacity of present equipment for producing gas, greater heat efficiency from present methods, and cheaper plant construction

Complete gasification of coal, by processes developed in Germany and elsewhere, is not satisfactory for city gas, Mr Powell warned He said the processes were planned for special gases and more research will be needed to determine the real value of complete gasification of coal

Science News Letter June 14 1947

PHYSICS

Atomic Age Alarm

Clicks of the Geiger counter sound warning of radioactivity. A metallic tube is the heart of this defense against atomic radiations

By RON ROSS

▶ CLICK click click, click, click, click—faster and faster, an ominous signal is heard

The atomic alarm has sounded It can be a warning, in time, against atomic bombs Or the death rattle of our civilization

Harsh, staccato noise emitted from an electronic device that scientists call a Geiger counter It clicks out its warning of radiation, such as that emitted from radium, or more pertinently from the mother stuff of atomic bombs, uranium Whenever dangerous radioactivity is sprayed out in radiations—X ray like gamma rays, alpha particles which are helium hearts, beta rays which are fleet electrons—the Geiger counter clicks

Mechanical Policemen

Tomorrow, in a world deadly fearful of illicit atomic bombs or atomic materials, Geiger counters will be the unsleeping mechanical policemen of the atomic age

You may not read about it, but the chances are that every passenger who steps off an international airplane or debarks from a transoceanic steamer will be given the once over with a Geiger counter

At the gateways to our public institutions, at the freight and package entrances to our critical and important offices, these warning devices will be on guard

Patrolling airplanes will carry them routinely to chart any unusual activity in the upper air The alarm could be sounded if a radioactive gas attack seemed approaching At critical and important places, such as 42nd and Broadway and atop Golden Gate Bridge, the counters will be on watch

Just as radar will constantly scan our frontiers for incoming ships by air and sea, so the detectors of radioactivity will be a part of the nation's defense

The difference between life and death in the future may be a metallic tube This tube is the heart of the Geiger counter Tell-tale radiations from uranium, plutonium or other radioactive materials sound the atomic alarm when they strike the remarkable tube of the Geiger counter

These rays cannot be seen with our eyes and are not felt by our bodies Most powerful ray from atomic bomb material is the gamma ray This is a sort of short wave X ray It is only one tenth as long as the shortest X ray but usually many times as powerful

Beta rays are high speed electrons, the negatively charged particles which are a part of all atoms They are not so penetrating as gamma rays but are more powerful than alpha rays, which are composed of "stripped" helium atoms

Hiding, or shielding, the rays of uranium from the tube of the Geiger counter would require huge amounts of lead for even a small bit of material Sneaking an atomic bomb or its materials into an area guarded by the counter will be difficult, if not impossible

The Geiger counter was first developed nearly 40 years ago by a German professor, Hans Geiger, and the famous English physicist, Lord Rutherford Later, Geiger and a German colleague, W Mueller, improved the counter so that it could count large numbers of particles in a short time The instrument is formally known as the Geiger Mueller counter

COUNTER TUBES—Each of these, used in Geiger counters, has a different ray-detecting job.

The counter is a million times more sensitive than most of the devices in scientific laboratories It measures the ultimate particles of matter A single particle of an atom triggers a click from the counter Yet, this sensitive instrument is amazingly simple

Balance in Tube

A delicate electrical balance is set up inside a tube When a bit of an atom, a ray given off from uranium or other radioactive material, penetrates the thin wall of the tube, it upsets this balance An electrical charge is given off This charge becomes a click for each ray entering the tube

The metallic tube may be of many different sizes Scientists at the National Bureau of Standards have developed a hypodermic needle type of counter tube This is hardly bigger than a small needle and is used for radioactive tracer work A novel counter was built from an empty tooth paste tube More common types of counter use metal tubes an inch or more in diameter The tube may be enclosed in glass or have a glass window

The thickness of the wall of the tube is important This determines which rays will be detected by the counter For spotting radioactive material, a metal tube which may block alpha and beta rays can be used To detect uranium, a gamma ray counter is sufficient These powerful rays can warn of radioactivity without help from beta and alpha radiations

Inside the tube of the Geiger counter is a wire running the length of the tube The wire connects insulting disks which seal the ends of the tube The tube contains a gas at low pressure

High voltage is applied to establish a strong electrical field between the wire and the tube The voltage is high enough so that the gas is just ready to "break down" This establishes a delicate electrical balance

The balance is broken by a ray penetrating the tube. The penetrating ray rips the gas molecules and frees charged particles, called ions. This produces an electrical discharge.

When the discharge is amplified by the Geiger counter, you hear a click. Each time a ray penetrates the tube, it sets off the electrical discharge and you hear a click.

Even away from uranium and other well-known radioactive materials, there is some clicking. Powerful cosmic rays from outer space penetrate the tube and cause clicks. Some materials which are not thought of as radioactive may send out some radiation which can produce some clicking.

But normally, the clicking of the counter is irregular. You can count the clicks in a minute. When radioactive material is brought into the room near a counter the clicks increase. They become a steady clicking, faster and faster as the material is brought closer. This is the atomic alarm system.

Lights rather than the audible clicks may indicate the counts. When the count is high enough to indicate danger from radiations to persons close to the counter a bell or other sound alarm may go off. Automatic counting devices can be installed to make a record of the rays counted.

Secret "Counting"

You may be "screened" for radioactivity without knowing it. Counters will probably be installed at some doors. The instrument could be camouflaged. If you walked through the door with a bit of uranium in a bag, the counter might set off a sound alarm system or a visual warning of radioactive material.

You will be "counted" many times for uranium in an age of atomic energy.

Geiger counters are used in nearly every stage of work with radioactive materials. Portable counters can be carried by prospectors searching for the stuff of the atomic bomb. A portable counter which weighs less than five pounds and has its own power from batteries is now on the market.

Science and industry use the counter in work with radioactive materials to help protect the health and lives of workers from the deadly rays.

The dangerous rays of radioactivity can be detected by equipment other than Geiger counters. But the Geiger counter is the most useful sleuth for tracking down the rays of uranium and other radioactive materials.

A practical rival of the Geiger counter for some uses is the electroscope. It can indicate radioactivity and atomic bomb materials though it is rated less sensitive than the counter.

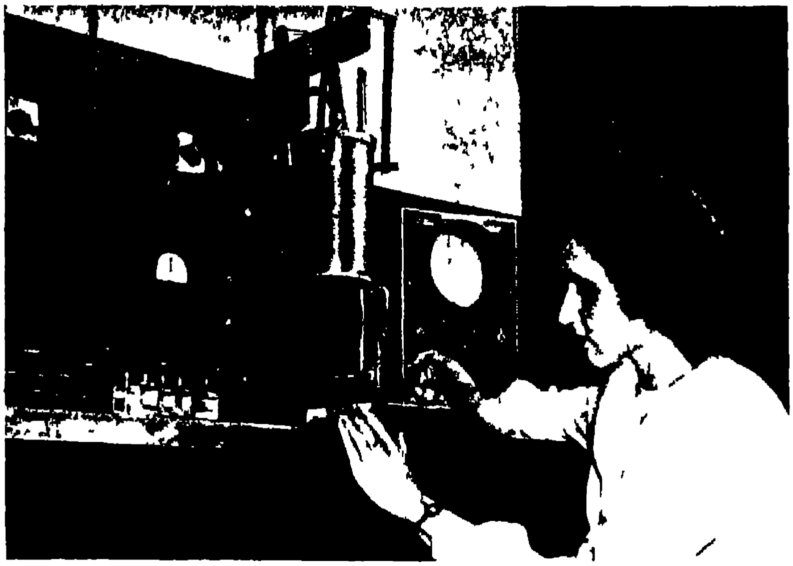
The simplest form of the electroscope has a gold leaf suspended from a vertical rod. When the rod is charged, the leaf stands out at an angle from the rod. As the charge of the leaf leaks away, the leaf swings down against the rod. The rate of swing indicates the conductivity of the air and can warn of the presence of radioactivity.

Electroscopes the shape and size of fountain pens were carried by workers on the atomic bomb project.

There are other detectors, which can warn of radioactivity, but they are chiefly useful to the scientist. He wants to know more than how many rays are counted. Science has other devices for research on how radioactive rays behave and other details from the life of an atom.

But for practical control of atomic energy—for locating uranium being transported illegally or warning of radioactivity attacks—the Geiger counter is our number one atomic sentry.

Science News Letter, June 14, 1947



GEIGER COUNTER—This detector is being used to test for radioactivity in dust gathered after the Bikini aerial explosion last July.

METALLURGY

Oxygen, Man's Life-Breath, Speeds Steel Production

➤ OXYGEN, life breath of man, can step up steel production, according to reports of the American Iron and Steel Institute.

The Institute reported that several plants for manufacturing oxygen are now under construction adjacent to steel plants. When the oxygen plants are in production, oxygen will find two important uses in steel production.

1. To increase the heat of the open hearth flame and save between 10% and 25% in fuel costs.

2. For stepping up the rate at which carbon is removed from the liquid metal.

Oxygen enriches the open hearth flame with increases in temperature of up to 500 degrees Fahrenheit. This can reduce the melt down time as much as 30%.

Bubbling oxygen into the molten bath speeds the reaction which separates the carbon from the metal in liquid form. This can save from 17% to 30% of the time required for the process.

In addition to faster production of steel, better steel may result from the use of oxygen. Some metallurgists have reported better quality steel from the oxygen-enriched processes.

Science News Letter, June 14, 1947

Do You Know?

The *magpie* is a natural thief, shiny objects are preferred by this bird

Juice from sound oranges only should be used if it is to be preserved by freezing

Gray-white *feathers* on the bald eagle's head give the appearance of baldness, but the bird is not bald

Because of a shortage of *iron* scrap used in making steel, iron ore is now being charged into the open hearth to promote chemical reactions

Soybean oil can now be successfully extracted in a pilot plant by an alcohol extraction process, a commercial plant to use this method is planned

Furfural, a chemical little known three decades ago but now widely used for many purposes, is made largely today from corncobs, still a farm waste

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GENERAL SCIENCE

Physics, Chemistry Lead With Top Young Scientists

➤ PHYSICS AND CHEMISTRY are the leading choices for major subjects among the brightest science minded young men and women in this country, as measured by returns on a questionnaire sent to all the contestants in the Science Talent Search conducted by Science Service and the Westinghouse Educational Foundation annually since 1942 Among the 1,800 who have been chosen, (300 each year) as the honors group, a majority favors physics The balance among the other contestants is slightly in favor of chemistry

Among the men in the honors group, the physical sciences are definitely favored This probably has a good deal to do with the total result, since male contestants have consistently been a little more than twice as numerous as female

Another favored field of choice is medicine More than 70% of the men who designated this as their choice are now carrying on premedical or medical studies Young women who indicated the same choice have to a considerable extent decided finally on nursing Between one third and one half of those who were medically minded are in nurses' training schools, less than a tenth are actually heading for the M D degree

Biology, the social sciences and non science fields have claimed relatively few of the men—only 1% to 4%—but more of the women, with the social sciences as their heaviest choice in this group

The war, by calling many of the men into armed services, and only a few of the women, has made a really satisfactory comparative study rather difficult However, the men are back in college now, many of them under the G I Bill of Rights, and they are rapidly making up for lost time

One incidental thing the study disclosed the brighter the student the more likely he is to answer a questionnaire about himself A higher percentage of the honors group returned their blanks than of the non honors group It must be emphasized, too, that this is not a comparison between bright students and dull ones practically everyone on the list, non-honors as well as honors, came from the top 20% of their high school graduating classes

These and other facts about the Science Talent Search "alumni" have come out of a ten-year study that is being conducted by Dr Harold A Edgerton of Ohio State University and Dr Steuart H Britt of McCann-Erickson, New York, psychologists who prepare the examinations and assist in the final judging of the contestants

Science News Letter June 14 1947

ORNITHOLOGY

Talkative Raven Is Very Wise Bird

➤ THE TALKATIVE raven, rather than the taciturn owl, is given credit for being a wise bird by Arthur Cleveland Bent of Taunton, Mass, U S National Museum Associate, in a new publication issued by the Smithsonian Institution

"The raven,' says Mr Bent, "is one of our most sagacious birds—crafty, resourceful, adaptable, and quick to learn and profit by experience'

Impossible to approach ordinarily, the bird makes itself at home around sea coast villages in northern latitudes, where its services as a scavenger are appreciated From Pennsylvania southward it is a mountain bird, seldom seen below an altitude of 3,000 feet

It has a considerable vocabulary of calls Most frequently heard is a hollow laugh "haw-haw haw haw" On the wing it sounds off with loud "crawks", interspersed with occasional more musical notes It sometimes goes "thung! like a big tuning fork, and it also has a metallic, tinkling song resembling that of the red winged blackbird but much louder Finally, it can imitate the calls of a number of other birds, such as geese and gulls

Ravens like to talk to themselves, says Mr Bent, sometimes keeping it up by the hour So absorbed do they become in these soliloquies that they often relax their watchfulness, letting an observer approach much closer than they usually permit

Science News Letter June 14 1947

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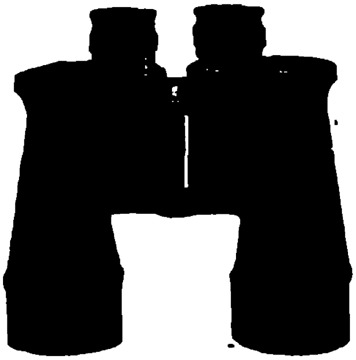

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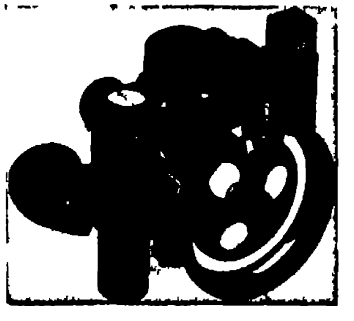

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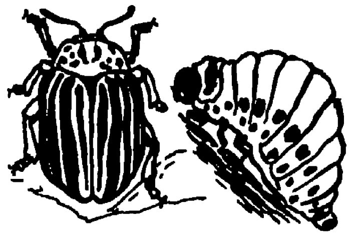
ENTOMOLOGY

NATURE RAMBLINGS

by Frank Thone



Feeding the Enemy

➤ INSECTS, it is often asserted and seldom denied, may eventually become the inheritors of the earth, by literally eating man out of house and home. There is no doubt that they are formidable, feeding as they do on everything man produces and uses, from his crops and timber to his clothes and even himself, and serving as carriers of disease as a final lethal fillip.

One aspect of the situation, however, is rather frequently overlooked. Most of the really bad insect pests were set up in business by man himself. Under natural conditions, a potential crop plant and its potential devourer are often separated by thousands of miles, it is far-travelling civilized man who brings them together. He also makes things all the easier for the pest by massing its chosen food plant in huge fields, and by devoting whole regions to the intensified production of one crop, like corn in the Midwest or cotton in the South.

As a typical instance, take a look at the striped potato beetle. It used to be a relatively insignificant insect, chewing the foilage of a few weed species related to the potato somewhere in the Southwest or in northern Mexico. When large-scale potato cultivation reached Colorado it got its real start. It travelled eastward from field to field, and finally reached Europe as a stowaway in shipped potatoes.

The chinch bug, scourge of Midwestern grain fields in dry seasons, offers another case in point. It has always existed where it is now found, feeding undestructively on native grasses, but not until white men began planting hundred-acre grain fields, edge to edge, did it multiply into devastating hordes that sometimes destroy those fields in a single day.

Of course, man does not always bring the crop to the insect. Probably the more usual experience is for him to bring the insect to the crop. The very names of some of our most troublesome insects are monuments to this unhappy fact: Japanese beetles, Hessian fly, European corn borer, Mexican bean beetle, Argentine ant, Oriental fruit moth—the list is a long one.

Whether man can exterminate the insects is still uncertain. But one thing is sure: if the insects succeed in exterminating man they will have destroyed their best provider.

Science News Letter, June 14, 1947

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WYOMING

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Write for folder—Paton Ranch, Shell, Wyoming

CHEMISTRY

Flame Cutting and Welding Use Fluorine and Hydrogen

➤ A WAR-BORN method for cutting and welding metals with flame that uses no oxygen is covered by U. S. patent 2,421,649, assigned by its inventors, H. F. Priest of New York and Dr. A. V. Grosse of Marcus Hook, Pa., to the Office of Scientific Research and Development.

Cutting and welding copper with flame has presented peculiar difficulties, partly because as soon as copper melts it forms oxides that interfere with the work, and even more because of the high thermal conductivity of copper, which carries away the heat before it can make the cut or weld.

The two engineers use a unique combination of gases, fluorine and hydrogen, to get an oxygenless flame of very high temperature—about 4,000 degrees Centigrade. This readily cuts copper. It is also good for welding because of the instant formation of copper fluoride, which serves as a flux, protecting the metal at once against oxidation and the corrosive effects of the fluorine gas itself.

Science News Letter, June 14, 1947

MEDICINE

Few Atom Bomb Survivors Have Serious Injuries

➤ IF AN atomic bomb were dropped over London, 75,000 people would be killed, 30,000 houses would be completely wrecked, 35,000 would be damaged badly and 50,000 to 100,000 would be damaged to some extent.

By contrast, a 500 pound bomb dropped in the same area would kill six people and a block buster would kill 30.

These figures, which are British estimates, were quoted by Col. James P. Cooney, medical adviser to the director of military application, Atomic Energy Commission, at a symposium at Walter Reed General Hospital in Washington.

Jap survivors of the atomic bombs had very few severe injuries due to mechanical force or flying debris, Col. Cooney reported. This was because the fire which swept both Hiroshima and Nagasaki after the explosions came so fast that no severely injured people could have escaped.

Changes in the color of the skin were striking features of the burns from the atomic bombs. Extreme dark color, like a walnut stain, appeared on those outside a certain range. At Hiroshima this gave a mask-like appearance. But inside this range, the skin lost its color although it was not always scarred.

These factors, Col. Cooney said, suggest that some of the victims were irradiated with ultraviolet light so intense that it completely destroyed the pigment, or color, layer of the skin. Others got only enough ultraviolet to stimulate the pigment layer, giving them a bronze color like a dark suntan.

Science News Letter, June 14, 1947

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• Books of the Week •

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Atomic Challenge—William Higinbotham and Ernest K Lindley—*Foreign Policy Assn*, 68 p, illus paper 35 cents Facts on atomic energy and its control for the layman

The Bacula of Some Fruit Bats (Pteropus)—D Dwight Davis—*Chicago Nat Hist Museum*, Fieldiana Zoology Vol 31, No 16 7 p, paper, 10 cents

Care of the Breast—Else K LaRoe—*Froben* 215 p, illus $3 75 A detailed treatment of the care of this important organ with emphasis on early recognition of symptoms leading to breast cancer

Color Atlas of Hematology—Roy R Kracke—*Lippincott* 204 p illus, $5 Brief clinical descriptions of the blood diseases are also incorporated in this atlas for medical students, technicians and doctors

Description of Professions Series—Nat Roster of Scientific and Specialized Personnel—*Govt Printing Office*, paper No 1, Agricultural and Biological Sciences, 15 cents, No 2 Engineering Sciences, 15 cents No 3 Medical Service Occupations, 5 cents, No 4, Medical Professions 10 cents, No 5, Miscellaneous Professional Fields 10 cents, No 6, Physical Sciences 10 cents, No 7, Social Sciences, 10 cents

The Family Diadectidae and Its Bearing on the Classification of Reptiles—Everett Claire Olson—*Chicago Nat Hist Museum* Fieldiana Geology, Vol 11, No 1, 53 p, illus, paper, 60 cents

Geographical Races of the Rodent Akodon Jelskii Thomas—Colin Campbell Sanborn—*Chicago Nat Hist Museum*, Fieldiana Zoology, Vol 31, No 17, 9 p, paper, 10 cents

Inside the United Nations A discussion Guide on Religion and the Peace, *Church Peace Union* and *World Alliance for International Friendship Through the Churches*, 42 p, illus, paper, 15 cents Designed for use by discussion groups this brochure contains additional references for further reading and plans for programs by groups

Petroleum Production Vol III Oil Production by Water—Park J Jones—*Reinhold*, 268 p, $5 Deals with convergence fluid factors, invasion factors displacement factors, and well interference factors

The Psychology of Ego Involvements—Muzafer Sherif and Hadley Cantril—*Wiley* 525 p $6 Development of the ego in childhood its reformation in adolescence involvements in group and social situations are discussed together with maladjustments disintegration and breakdowns of the ego

Redescription of Taphrosphys Olssoni, a Fossil Turtle from Peru—Ranier Zangerl—*Chicago Nat Hist Museum*, Fieldiana Geology, Vol, 10, No 5, 39 p, illus, paper, 20 cents

A Second Look—Edward H Faulkner—*Univ of Okla Press*, 193 p $2 Discussion of the theory of soil impoverishment

The Shortage of Professional Workers in Agriculture and in Forestry—Committee on Training of Research Workers in Agriculture of the Agriculture Board—*Natl Res Council*, Circular 127 20 p, paper, 25 cents

Stepping Stones Towards the Future Twenty Seventh Annual Report of the National Bureau of Economic Research—Arthur F Burns—*Nat Bur Econ Res* 91 p, paper, free A discussion of the long term economic outlook and seven essay reports by the research staff

The Strange Story of the Quantum—Banesh Hoffman—*Harper* 239 p, $3 A popular history of the discovery of the composition of the atom

Temperature Its Measurement and Control in Science and Industry—*Am Inst of Physics*, 1362 p, illus, $12 50 A collection of papers presented at a Symposium under the auspices of the Society with the cooperation of the National Bureau of Standards and the National Research Council

Time Knowledge, and the Nebulae An Introduction to the Meanings of Time in Physics Astronomy, and Philosophy and the Relativities of Einstein and of Milne—Martin Johnson—*Dover Publ*, 189 p, $2 75

Trace Elements in Plants and Animals—Walter Stiles—*Macmillan* 189 p, illus, $2 75 A digest of information on deficiency diseases resulting from lack of micro nutrients

Science News Letter June 14 1947

London, preparing for a place as the crossroads of airplane routes, is constructing an *airport* covering seven square miles of area, this is over six times the area of the National Airport serving Washington, D C

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• New Machines and Gadgets •

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❋ *PHOTOGRAPH FRAME, which contains fluorescent lighting to illuminate the picture, spreads a soft illumination over the photograph that increases its visibility and brings out the richer tones and beauty in good photographs.*

Science News Letter, June 14, 1947

❋ *WATER TURBIDITY is accurately measured by a naval instrument called a hydrophotometer. It has a meter box above the water and a suspended head submerged at the desired depth. Turbidity, of importance in underwater photography, is determined from electric currents from two photocells in the head actuated by the same light, one directly, the other through 20 inches of water.*

Science News Letter, June 14, 1947

❋ *FLASH GUIDE for photographers provides accurate flash exposure information with the twist of a dial. The cardboard dial in its frame is adjusted so that a code number, representing the film lamp shutter combination to be used, is opposite an arrow on the top of the card, then the correct lens opening shows on the bottom.*

Science News Letter, June 14, 1947

❋ *REMOVABLE TRAY to hold toilet articles may be quickly inserted in the ordinary bathroom medicine cabinet. Extension arms with rubber cushion pads hold it in place when the wingnuts are properly tightened. The tray is of transparent plastic, as shown in the picture.*

Science News Letter, June 14, 1947

❋ *RADIO FREQUENCY operated edge gluing press, for use in furniture making, generates heat within the product itself, taking minutes for what formerly took hours. Flat plates in the electric circuit on each side of the press develop an electric field between them thereby creating heat in the wood cores and drying the glue.*

Science News Letter, June 14, 1947

❋ *PORTABLE mist blower, for insect control work, delivers extremely small amounts of concentrated insecticides on 35 foot trees in the form of a finely atomized spray. Atomization is accomplished by a large volume of air at high velocity coming through a tubular tunnel from a powerful fan.*

Science News Letter, June 14, 1947

❋ *CIRCULATOR for bottles in refrigerators is a wire basket without a front, but with a partial partition in the center and a series of rollers on its curved rear. When a fresh bottle of milk is inserted on one side of the partition and pushed the rollers help bring older bottlers to the front on the other side.*

Science News Letter, June 14, 1947

Question Box

AERONAUTICS

How can helicopters land on water and marshy ground? p. 379

CHEMISTRY

How can welding and flame cutting be done without oxygen? p. 382

ENTOMOLOGY

Who set up the bad insect pests in business? p. 382

GERIATRICS

Where are scientists hoping to find the fountain of youth? p. 371

MEDICINE

Are blackouts permanently damaging to pilots? p. 372

How can the swollen clammy hands and feet of polio victims be relieved? p. [illegible]

What are the new tests for telling whether it will be a girl or a boy? p. 377

What causes plane accidents in pairs? p. 372

NUCLEAR PHYSICS

What are the three mysteries of the heart of the atom? p. 376

OCEANOGRAPHY

How can scientists tell if an atoll is building up or on the downgrade? p. 377

PHYSICS

How does the Geiger counter operate to sound the clicks of the atomic age alarm? p. 378

PSYCHOLOGY

To what do we owe our civilization? p. 374

Pictures: Cover, U. S. Coastguard; Westinghouse, p. 371; Army Air Forces, p. 373; North American Philips Co., p. 378; Kodak Research Laboratories, p. 379

Where published sources are used they are cited.

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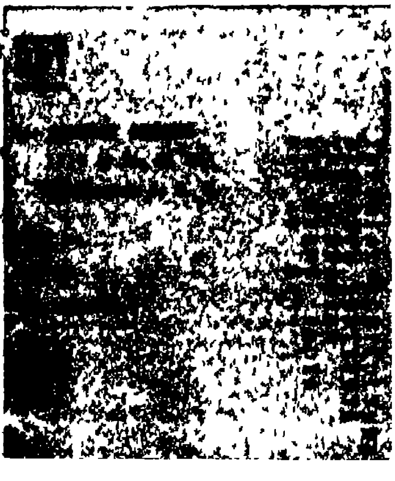

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SCIENCE NEWS LETTER

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RADIOACTIVITY

Isotopes Needed Abroad

Federation of American Scientists has urged the Atomic Energy Commission to make radioactive isotopes available to foreign scientists.

➤ RADIOACTIVE isotopes from America's uranium piles should be made available for scientific research anywhere in the world, the Federation of American Scientists has declared in an appeal to the U S Atomic Energy Commission

A letter from the Federation council, signed by 13 American leaders in science, asks the Commission to make available radioactive materials 'which are not involved in the production of weapons (to) responsible scientists and institutions throughout the world as soon as possible "

The letter makes a special appeal for radioactive carbon 14 for the Curie Laboratory in Paris Irene Curie, co discoverer of radioactivity and daughter of Marie Curie, is the director of the laboratory

' The inexpensive quantity production of these materials in uranium piles now opens new vistas in fundamental research, and in the study and control of disease," the letter states in urging international distribution of radioisotopes

"American science and medicine will profit, as they have in the past, by such a stimulation to world wide study," the American scientists said

"Even more important will be the clear evidence of our desire to place our unique resources at the service of mankind," continued the letter

The scientists quoted a European delegate to the United Nations Atomic Energy Commission as saying that the first shipments, before the war, of heavy water from this country to Europe were "the best ambassadors of good will and international cooperation that American scientists could have sent to their European colleagues "

In calling for the shipment of radioactive carbon to the Curie Laboratory, the scientists said the situation "offers a unique opportunity a peculiarly fitting setting, for dramatizing our national intention and for offsetting to some extent the ill feeling which restrictions upon science in this country have engendered abroad "

Science News Letter June 21 1947

CHEMISTRY

Colloids in Food Industry

➤ IF HARD water must be used in making mayonnaise dressing, add a little more mustard

That isn't just a rule of thumb kitchen trick, there's real science in it The mustard is an emulsifying agent, introducing a new set of electrical charges that latch onto the trouble-making calcium ions in the hard water and get them out of the way

This was one of the practical ways in which a knowledge of colloid chemistry helps in the food industries, Prof Ernst A Hauser of the Massachusetts Institute of Technology told the meeting in Boston of the Association of Food Technologists

Colloids, and their near relatives, emulsions, are intimate mixtures of two or more liquid substances in droplet or other finely divided phase, and their chemistry is to a considerable extent a study of the interrelations of the electrical charges borne by these minute particles Familiar examples among foods are salad dressings, cheese, jellies, custard pie fillings and cornstarch puddings It is tragedy enough to a housewife if a dozen glasses of jelly won't jell, but it may mean bankruptcy to a manufacturer if it happens to a hundred thousand dozen glasses That's why he has to be right the first time, and there's where a knowledge of colloid chemistry can help him

"Another problem with which the food industries are confronted was only recently brought to my attention by Dr Cecil E Dunn," the speaker continued "The use of detergents for the cleaning of soiled glassware or metal containers is based exclusively on colloidal phenomena However, what struck me most was a statement made by a member of the audience to the effect that he could not understand why a wetting agent like hexametaphosphate cleans bottles better than a solution of sodium hydroxide

'The colloid chemist has the answer quite handy The phosphate is adsorbed on the surface of the particles which will deposit on the glass or tin Their electric charge is thereby increased and this will result in their rapid dispersion and removal by washing "

Science News Letter June 21 1947

GENERAL SCIENCE

Independent Research Important in Industry

➤ INDEPENDENT laboratories for scientific research and testing play an important part in America's industrial advancement, a recent survey of their work shows The survey was made by the American Council of Commercial Laboratories to obtain information for a report to the President's Scientific Research Board

There are approximately 275 such laboratories They employ some 5,000 persons, the majority of whom are scientists and technicians This figure does not include the approximate 2,000 laboratories maintained by individual corporations and other manufacturers and producers These exist primarily for the companies which operate them The independent laboratories are for smaller companies, and are ready to tackle almost any scientific industrial problem presented to them Work already accomplished extends from metals and foodstuffs to packaging and paints

Science News Letter June 21 1947

ENGINEERING

Sailors to Be Protected By Plastic "Greenhouse"

➤ SAILORS on the exposed bridges of future Navy ships may be protected from blast, weather and fumes by a transparent plastic "greenhouse "

First installation of the plastic shelter is being completed on the light cruiser USS Manchester, now enroute to Newport, R I, from the Mediterranean

Plastic panels mounted in a metal framework are being used If the "greenhouse" passes its tests, the life of a Navy sailor will be more pleasant, and perhaps longer

The plastic blast and-weather hood was designed and constructed at the Navy Shipyard in Boston Plastics being tested are acrylic resins

Science News Letter, June 21, 1947

2 C AUG 1947

CHROMOSOME PHOTOGRAPHED—This picture showing the structure of gene-carrying matter was taken by an electron microscope

MEDICINE

Clues to Stomach Cancer

Simple indications lead to detection of stomach cancer if they are given attention early Cancer can be removed before it grows large

Highlights of the American Medical Association's centennial meeting, covered for Science Service by Jane Stafford can be found on pages 387 through 390 and page 392

➤ NEW CLUES for detection of stomach cancer before it becomes incurable were presented by Dr Gilson Colby Engel of Philadelphia at the meeting in Atlantic City of the American Medical Association

The clues are so simple that the average patient and doctor might overlook their significance They are a weak and tired feeling, loss of appetite, particularly for meat, and a mild kind of indigestion or stomach discomfort that comes either before or after eating

Stomach cancer is at present one of the most hopeless forms of this disease It kills 38,000 persons a year in the United States, more than any other kind of cancer One person dies of stomach cancer every 18 minutes

This "startling" high mortality rate can be reduced, Dr Engel stated

Stomach cancer can be cured by an operation to remove the cancer, if the patient gets to the surgeon before the cancer has grown so large and spread so far through the body that it is too late

The operation, even when the entire stomach is removed, carries a mortality rate of only 18% If only part of the stomach needs to be removed, the mortality is less than three percent But without the operation, mortality for stomach cancer is 100%

Pain, loss of weight, anemia, nausea and vomiting of blood are not reliable early signs of stomach cancer In the majority of cases, they appear too late

For saving the thousands of lives taken each year by stomach cancer, Dr Engel urged the following procedures

1 Patients to see their doctors if stomach symptoms of any kind, or a weak tired feeling or loss of appetite lasts more than two weeks

2 Doctors to make X ray studies at once on patients complaining of these symptoms "You must not forget that the patient has tried all the medical preparations and vitamins before he came to you," Dr Engel warned

3 Every annual physical check up to include X rays of the stomach

4 Operation to be done on any patient diagnosed as having stomach ulcer in whom after four weeks of medical treatment X-rays show the ulcer still present even if the patient no longer has symptoms

Many patients with stomach cancer, Dr Engel said, are relieved of symptoms by medical treatment for stomach ulcers But the relief is only temporary And when next they have pain, indigestion and other symptoms the cancer has reached the hopeless stage It is because of this danger, when early stomach cancer is mistaken for stomach ulcer, that he urged operation if the supposed ulcer still shows on the X ray picture after four weeks, even when the patient's symptoms have been relieved

Science News Letter June 21 1947

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GENETICS

Knowledge About Heredity From Photograph Studies

➤ THIS PICTURE, which an imaginative youngster might tell you is a Jubjub Bird fleeing from a Frumious Bandersnatch, is in sober actuality a record of the newest triumph of that almost fabulously powerful research tool, the electron microscope It is the first electron microscope photograph of chromosome details to be published in a newspaper Similar photographs were published in *Science* (June 13)

Chromosomes, as you may recall, are the extremely minute particles of living matter in the nuclei or centers of cells that carry the units of heredity, or genes Genes determine whether you are blonde or brunette, tall or short They are so small that even the most powerful of ordinary microscopes fail to give sufficiently large scale views of their details But they are so fragile and delicate that there seemed no way to lay them out properly for the bombardment with electron streams that makes pictures in the electron microscope

The problem was finally solved by Prof John T Buchholz, head of the botany department at the University of Illinois Using instruments so fine pointed that their operation has to be guided through a microscope, he dissected several types of plant cells, snared out their chromosomal threads and laid them on the electron microscope's specimen holder The chromosomal material dried and hardened sufficiently to withstand the brief but intense electron bombardment

The chromosomal threads shown here, at originally photographed 30,000 times their actual size, were taken out of one of the pollen-forming cells in the tassel of a corn-stalk The darker, bead-like masses may be the actual genes, or at least the places where these elusive ultimate units of heredity reside They appear to be strung together on a ribbon-like uniting filament, much smaller than the dark masses

Now that a method for getting photographs of chromosomes has been developed, it can be expected that it will be used in obtaining a more exact knowledge of heredity

Science News Letter June 21, 1947

MEDICINE

Instrument Fights Cancer

Bronchoscope is used to diagnose lung cancer and may save hundreds of persons a year in the U S. This method succeeds when others fail

➤ A NEW WAY to fight cancer was announced by Drs Louis H Clerf and Peter A Herbut of Jefferson Hospital, Philadelphia, at the meeting in Atlantic City of the American Medical Association

A quarter or more of the 6,000 persons who die of lung cancer every year in the United States may be saved as a result

An instrument familiar to doctors and to many parents is the chief weapon that will save more and more lung cancer victims The instrument is the bronchoscope, a long, narrow, hollow tube that reaches down the windpipe to the lungs It has already saved thousands of lives of children who accidentally sucked toy whistles or safety pins or buttons into their lungs

Now the bronchoscope can be used to suck out microscopic bits of tissue from the farthest parts of the lungs Examined under the microscope, these bits of tissue will tell whether or not the patient has a cancer in his lungs

The cancer can be detected in this way when no other method will reveal its presence If the cancer is found early enough, the patient can be saved by having the cancer or the entire lung removed

First sign of lung cancer that takes a patient to his doctor is a dry cough He may spit a little blood X-rays of his chest may or may not have a suspicious shadow But all these signs may mean some condition other than cancer They may mean tuberculosis

A tiny forceps attached to the end of the bronchoscope will pinch out a bit of tissue for examination if the cancer is near enough the windpipe to be reached by the bronchoscope

When it is way off at the edge of the lungs, Drs Clerf and Herbut shoot a little salt solution through the bronchoscope and suck it back out again If the cancer is present, a few cells shed by the cancer, the way the skin normally sloughs off cells, will be sucked out in the salt solution They can be identified under the microscope and the diagnosis made

In the past year, Drs Clerf and Herbut have detected 32 cancers, out of a group of 118, that had not been detected by any other method

Science News Letter June 21, 1947

MEDICINE

Test for Pregnancy Gives Answer in Only Two Hours

➤ A TEST for pregnancy that gives the answer in only two hours was announced by Drs Herbert Kupperman and Robert B Greenblatt of the University of Georgia School of Medicine to the American Medical Association meeting in Atlantic City

The test is made by injecting a few drops of the woman's kidney excretion into an immature rat Two hours later the rat is killed by an overdose of ether If the rat's ovaries are red and engorged with blood, the woman is pregnant

The test has been done for more than 1,200 patients It was accurate in 99 8% of the cases

Prime purpose of the test is not just to tell a healthy woman that she is going to have a baby but to give the doctor a chance to save life in cases of ectopic pregnancy In these cases, the baby is developing in the mother's body but outside the womb This unnatural state of affairs endangers the baby and the mother, too In many cases, speedy operation can save the mother

The signs of this condition may be mistaken for appendicitis or for tumors The new two-hour test will give the diagnosis between the time the patient is brought into the hospital and the doctor and patient are scrubbed up and prepared for the operation Other pregnancy tests take from six to 96 hours

Science News Letter, June 21 1947

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MEDICINE

Results of Sleeplessness

Changes confined to brain. May involve same mechanism as schizophrenia. One night's sleep restores voluntary victim of insomnia to normal.

➤ GOING for five days and nights without sleep can make a healthy young man "see things," laugh and talk crazily, and show other symptoms of the serious mental disease, schizophrenia

But one night's sleep restores the voluntary victim of sleeplessness, or insomnia, to normal, Dr David B Tyler of the Army Chemical Center's Medical Division at Edgewood, Md, Arsenal reported at the American Medical Association's centennial meeting in Atlantic City

Hundreds of soldiers, marines and conscientious objectors took part in the studies, made to learn how long men in combat could stay awake and remain efficient fighters

Better understanding of mental disease may come from clues furnished by the study

"We feel there is a relation between the mechanism in the brain that produces changes as a result of sleeplessness and the mechanism that produces the disturbances in schizophrenia," Dr Tyler said

All the changes produced by the five days and nights without sleep were confined to the brain They showed up after about 36 hours of sleeplessness Seeing double, hallucinations, irritability, unreasonable laughter and irrelevant conversation, memory deterioration and remarks made as if the men were in a dream state were the signs of mental change

Brain wave records also showed the effects of the long time without sleep

Heart rate, blood pressure, body temperature, visual ability, and capacity to do physical work were not impaired by the prolonged period without sleep The men actually gained weight, but this was because they were given a fourth meal at midnight

Reaction time and steadiness were just as good on short tests, but fell off when the tests were prolonged Benzedrine, familiarly known as "pep pills," prevented the deterioration in performance when it was given after the second day If given from the start of the five day sleepless period, it was not effective Its action came through its ability to help the men stay awake while performing the tasks

Science News Letter June 21 1947

DENTISTRY

Penicillin Reduces Caries

➤ BRUSHING your teeth with a tooth powder containing penicillin may make you less likely to have cavities, or dental caries

That is the promising report of two doctors who used 252 human guinea pigs to study the use of penicillin as a weapon against tooth decay In the experiment, 161 boys from a northern Ohio industrial school brushed their teeth for five months with a powder containing penicillin At the end of the period, the doctors made counts of the number of *acidophilus bacilli* in the boys' mouths This bacillus forms the acids which cause tooth decay

Of the boys who had used penicillin in their tooth powder, 65% had a lower bacillus count, while only four percent had an increased count Among the boys who had not had the penicillin powder, 43% had fewer bacilli and 20% had a higher count

Drs Thomas J Hill and Albert H Kniesner of the Western Reserve University School of Dentistry explained that the experiment will continue another year

"This study does show that penicillin produces a decrease in susceptibility to dental caries," Dr Hill declared "We can not say now whether we will be able, at the end of our studies, to recommend the inclusion of penicillin in dentifrices for the prevention of tooth decay

"We want more positive results, but I believe we will get them," he added

The doctors explained that every time a boy brushed his teeth with the powder, he took between 500 and 1,000 units of penicillin into his mouth This is a very small amount of the drug

Another experiment with penicillin and tooth decay revealed that rats taking penicillin in drinking water had fewer cavities in their teeth than control animals, which received no penicillin

The studies are being made under grants from the U S Public Health Service and the Cleveland Dental Society

Science News Letter June 21 1947

ZOOLOGY

Roman-Nosed Rodents Flown Up from Haiti

➤ A PAIR of Roman nosed rodents from Haiti have just been added to the population of the Chicago Park District's Zoo in Lincoln Park Their everyday name is Hutia to zoologists they are Capromys, which translates into English approximately as "goat-mouse"

That goat-mouse reference may be an allusion to their climbing proclivities Hutias spend a good deal of their time in trees, so in the Lincoln Park Zoo they have been put in the monkey house and given a tree limb to climb around on They eat almost anything—fruits, leaves, bark, as well as small animals They have a special liking for lizards

A pair of Chicago writers, Mr and Mrs Oden Meeker, made arrangements for the acquisition when they were touring in Haiti, and the animals were brought to Chicago by plane

Science News Letter June 21 1947

RARE RODENT—From Haiti, this tree-climbing animal was formerly believed extinct.

MEDICINE

Strain on Heart Measured

Effect of emotions on heart and blood vessels can be measured by change in size of fingers and toes Doctors hope to learn what wears out the heart.

➤ THE CASE of a healthy young man who could raise his blood pressure at will, simply by thinking about his girl, was reported by Drs George F Burch and Clarence Thorpe Ray of New Orleans at the meeting of the American Medical Association in Atlantic City

His case was significant because when his blood pressure went up under the influence of exciting thoughts, the doctors could detect and measure a change in the size of his fingertips

The fingertip change resulted from the effect of excitement on his heart and blood vessels

Doctors have long known that excitement and other emotions, such as fear, anger and worry, can raise the blood pressure and cause heart and blood vessel changes But they have never before had such an accurate method of measuring the effects of emotions on the heart and blood vessels

High blood pressure and heart disease might, in some cases, be prevented by such a method It might be used to detect unconscious worry or fear before these emotions can cause permanent, damaging change to heart and blood vessels

Then the doctor could apply psychiatric methods to help the patient overcome his unconscious fears and escape the damage they can cause

The fingertip change is measured by a newly-devised instrument, the plethysmograph Plethysmo means increase, graph means record The Cambridge Instrument Company made it according to Dr Burch's design

The patient's finger, or toe, is placed in a small glass cup which is sealed around his finger As the heart beats, pumping blood into the finger, the finger expands This forces a tiny bit of air out of the cup into a tube and to a recording device The air writes a record of the change in size of the finger as the blood flows in and out Emotion which narrows the blood vessels in fingers and toes reduces the amount of blood flowing into them and changes their size

These changes, very minute, are constantly going on in all of us Our small blood vessels, at the ends of our fingers and toes, are in a constant changing state of turmoil, Dr Burch said The ringing of a bell, the slamming of a door, someone coming into a room, all cause changes in the blood vessels of fingers and toes They show on the plethysmograph

From study of these records, the doctors hope to learn which changes are normal and necessary and which produce the "subtle but repeated wear and tear" that ultimately results in disease of the heart and blood vessels

Science News Letter June 21 1947

MEDICINE

Gland Chemical Gets Trial

➤ FIRST USE on a human subject of a recently purified gland chemical was announced at the meeting of the Association for the Study of Internal Secretions

The human guinea pig was a normal young woman She was given the chemical for a month at the Mayo Clinic

The chemical is the adrenocorticotrophic hormone It is produced by the pituitary, small gland at the base of the brain It acts on another part of the glandular mechanism, the adrenal glands above the kidneys which in turn produce adrenalin and other powerful hormones

The experiment with the young woman serving as guinea pig showed that the hormone stimulates human adrenal glands as well as animal and that pituitary hormone extracted from animals can be used in man

The experiment was reported by Dr H L Mason of the Mayo Clinic and Dr C H Li of the University of California

Next step, the scientists said, will be to use the hormone in a patient whose adrenal glands are not functioning efficiently They cautioned, however, that the adrenocorticotrophic hormone cannot be obtained at present for clinical work

For the month long experiment at Mayo Clinic, the pituitaries of 15,000 sheep were required However, Dr Li, who isolated the adrenocorticotrophic and three other hormones, indicated that future research may result in better extraction methods, with some hope that the pituitary hormones some day will be available for clinical use

The adrenocorticotrophic hormone is produced by the pituitary to stimulate the action of the adrenal glands, the two flat ductless bodies located one above each kidney General debility, a decreased utilization of protein and a disruption of body metabolism result from a deficiency of this hormone Diabetes is also associated with the adrenals

Twenty five milligrams of the hormone per day was found to be sufficient to produce significant stimulation of the adrenals The amount of stimulation was determined by analyzing certain steroid compounds in the urine, which provide an indication of the activity of the adrenals

The adrenocorticotrophic is one of four pituitary hormones which cannot be synthesized, but has been isolated in pure form by Dr Li The other three are the growth, lactogenic, which stimulates lactation in mothers, and the luteinizing hormone, which stimulates the growth of cells forming the outer envelope of the fertilized ovum in pregnancy

Science News Letter June 21 1947

VETERINARY MEDICINE

Fowl Tick Spreads Serious Poultry Disease

➤ A SERIOUS poultry disease known as fowl spirochetosis is transmitted by the bite of the fowl tick, a widely distributed parasite of birds, states A L Burroughs in *Science* (May 30) Experiments he performed in the economic zoology laboratories of the University of Minnesota proved conclusively what had been strongly indicated in earlier work by other researchers

The organism that causes the disease is a corkscrew-shaped germ fairly closely related to the one that causes syphilis in human beings Once its numbers are built up sufficiently in a chicken's blood, the bird becomes droopy and inactive, loses appetite and weight, and develops diarrhea If it recovers it will be immune to the disease for a long time The death rate in a flock may be high Mr Burroughs cites Old World onsets that wiped out from 60% to 90% of afflicted flocks

Science News Letter June 21, 1947

ARCHAEOLOGY

Mayan Art Discovered

Burial mound yields centuries-old work of craftsmen who lived before Columbus. Finest piece of Mayan jade yet found was uncovered.

➤ ART WORK, produced centuries ago by Mayan craftsmen, has been dug out of a burial mound in Guatemala in the latest discovery of American archaeologists probing the ruins left by a people who prospered in northern Central America and southern Mexico hundreds of years before Columbus

Works in jade and pottery, some of the finest Mayan pieces ever found, have been uncovered in the tombs near the village of Nebaj in northern Guatemala by Carnegie Institution of Washington scientists The find was made in the same region where Carnegie Institution archaeologists and the United Fruit Company expedition have reported the discovery of many Mayan temples in recent months The temples were located in the southern frontier region of the Mexican state, Chiapas, north of the little known Guatemalan highlands

One of the prize finds in the mound was a plaque or breastplate described as the finest example of Mayan jade yet discovered The piece is a highly polished plate, one inch thick, four inches wide and six inches long On it are carved a priest or ruler seated on a dais decorated with a human face and astronomical symbols Faces of Mayan gods are carved around the border of the apple green and white piece of jade

Estimated age of the plate is a thousand years Art uncovered in excavating the single mound is believed to cover some seven to eight centuries

Excavation of the mound was directed by A Ledyard Smith of the Carnegie Institution While the scientists dug out the tombs, descendants of the ancient Mayas, Indians who still live in the region, continued to worship at the mounds, including the one under excavation

At the ancient village, Nebaj, 20 mounds have been discovered, but the one probed recently was only the second to be excavated by archaeologists In ancient times, shrines or temples crowned the mounds, but they were built of wood and have long since disappeared

The rainy season has ended the present work on the Mayan site, but new excavations are expected to be made later Postwar revival of interest in the most brilliant pre Columbian Americans is giving important new knowledge about the life and achievements of the ancient Mayas

Science News Letter, June 21, 1947

CHEMISTRY

Black Uranium Brick Born in Archery Shed

➤ A BLACK BRICK was proudly displayed by Chairman David E Lilienthal of the U S Atomic Energy Commission to editors attending the Inland Daily Press Association meeting in Chicago

He explained that the brick was made of uranium and that the first successful production of uranium metal for nuclear fission was accomplished in the Midwest, at Iowa State College, Ames, Iowa But Mr Lilienthal did not tell the editors about a long wooden shed where coeds used to practice archery in physical education classes

Maybe Mr Lilienthal doesn't know about the shed that jumped out of Robin Hood into the atomic age

The historic shed is hidden among imposing college buildings on the east side of the large campus of Iowa State College Before Pearl Harbor, bales of hay were piled at one end of the shed with a target for college girls to shoot arrows at

Then one day in 1942 the hay and target were taken out and coeds left the shed Workmen constructed partitions inside, while armed guards stood watch 24 hours a day

In the shed and in a carefully guarded section of the college's chemistry building, scientists were working on purifying uranium Under the direction of Dr F H Spedding of the college chemistry faculty, they developed a process for making uranium pure enough to be used in nuclear fission Uranium went from the former archery range to Chicago's Stagg Field for the first chain reacting pile

The process developed in the wooden shed at Iowa State College was used to produce uranium for the chain reacting piles from which came the stuff of the atomic bombs dropped on Japan

Mr Lilienthal's black brick was born in the shed where coeds used to shoot arrows

Science News Letter, June 21, 1947

JADE PIECE—This breastplate is the finest piece of Mayan jade ever found. It shows a priest talking to a man, apparently attempting to show the magnificance of the man by making him so small.

CONSERVATION

Russian Farmers Replant Shelterbelts on Steppes

➤ SHELTERBELTS protecting farms on Russia's steppes, systematically destroyed by the enemy during the war, are now being replanted by the farmers, states the USSR Information Bulletin, published in Washington These tree belts perform much the same function as those on the American plains, which are like the steppes in many respects They reduce wind erosion, hold snow until it can melt, and check hot winds in summer

Dramatic evidence of the value of shelterbelts was given in the Odessa region last spring Fragments of the tree zones that had escaped the havoc of war saved the grainfields in their lee when dust storms raged Elsewhere, heavy layers of dust smothered the crops

Science News Letter June 21 1947

CHEMISTRY

Thermal Process Fixes Nitrogen as Nitric Oxide

➤ FIXATION of atmospheric nitrogen as nitric oxide (NO) is accomplished without use of electricity, by thermal means alone, in a twin furnace on which Dr F G Cottrell, well-known Washington scientist, has received patent 2,422,081

The gas mixture is passed through a bed of incandescent oxide "pebbles", further heated in the combustion chamber, then suddenly cooled by being passed into the second chamber and into its bed of unheated pebbles

When the cooling bed has become entirely hot, the process is reversed, and the now cooled-off first bed is used for quenching Rights in the patent are assigned to the Wisconsin Alumni Research Foundation

Science News Letter June 21 1947

ELECTRICAL ENGINEERING

Scientists Help Navy Plan Better Lighting for Ships

➤ CIVILIAN illuminating engineers are helping the Navy plan stronger lighting fixtures and better lighting for Uncle Sam's fighting ships

Normal home and office lighting fixtures cannot stand up under the shock of a ship's guns firing Wartime substitute fixtures, without glass, did not do as good a lighting job as commercial fixtures ashore

Twenty civilian engineers are serving in an informal advisory capacity to help the Navy solve the lighting problem Experiments have been conducted aboard two inactive ships, the USS Phoenix, a light cruiser, and the submarine, USS Permit Seven of the engineers also went on a cruise aboard the giant aircraft carrier, USS Midway, to study special lighting problems aboard carriers

In addition to developing more durable shipboard lighting fixtures, the study includes the problem of lighting in relation to the colors of decks, bulkheads and furniture, heat generated by lamps and the effect of salt air on lighting fixtures

Lighting aboard Navy ships has become more important because portholes, which let in sunlight, are on the way out During the war, port holes were sealed and the Navy said none of the newer ships have them This means shipboard lights must operate 24 hours a day in some cases

Experimental designs have been developed and some fixtures have been installed for service tests, the Navy reported

Science News Letter June 21 1947

TEXTILES

Rayon Hosiery Yarn Made in Record Time

➤ THE YARN from which rayon hosiery is made can be turned out in two minutes and 15 seconds instead of 60 hours, using an automatic machine developed in Germany

American investigators studying the German textile industry have reported the development of the Dureta machine and process which speeded the production of German rayon hosiery As used at the Bemberg-Wuppertal plant at Dormagen, Germany, the machine was expensive to operate and maintain, but the Germans said improvements in it might revolutionize yarn production

In the process, yarn is produced without being touched by hand The yarn is described as of high quality, good tenacity and elongation, and up to 80% of the yarn will make first-grade stockings

The Dureta machine has 204 spinning funnels in three rows of 68 funnels and corresponds to half of a spinning machine Threads in the machine are processed automatically

Science News Letter June 21, 1947

IN SCIEN

BACTERIOLOGY

Germs May Be Bred To Make War on Disease

➤ MORE DISEASE remedies of the penicillin type may be developed by breeding germs to produce chemicals that will fight other germs, Sir Howard Flory, the English doctor who with his wife was first to use penicillin as a remedy, told members of the American Medical Association at their meeting in Atlantic City

He cited Swedish efforts along this line No such remedy, made by "inducing" germs to produce it, has yet been developed But efforts to do this are "clearly worth while," he said, because it might be possible to produce remedies against specific germs

Hundreds of substances produced by molds, fungi and bacteria which act against germs have been discovered Only a few, however, are useful in treating disease Some are too weak in their anti-germ action Others are too poisonous

Looking for a new remedy like penicillin or streptomycin is "something like taking a ticket in a lottery," Sir Howard said

"It is quite possible that there are some tickets with prizes still"

Science News Letter June 21 1947

ENTOMOLOGY

Poisoned Peanut Shells Kill Alfalfa Snout Beetles

➤ POISONED peanut shells are the strange Borgian banquet offered to the alfalfa snout beetle, an introduced pest localized in two New York counties Before the war they got poisoned raisins, now they have to be content to die on cheaper fare They may not even get the peanut shells, if new spraying and dusting methods now being tried out by New York State Agricultural College entomologists prove effective

Despite its name, the alfalfa snout beetle does not confine its attacks to alfalfa It feeds readily on many plants of the pea and clover family, and on several genera as well Closest possible control, therefore, is desirable

Science News Letter, June 21, 1947

FIELDS

ENGINEERING

Reverse Shot-Tower Makes Very Fine Metal Powders

➤ A MACHINE for making very fine metal powders is covered by patent 2,422,099, issued to Siegfried Hiller of New York It might be described as a shot-tower in reverse, with furnace attachments A wheel covered with steel fingers, revolving in a closed chamber, dips into the surface of a pool of melted lead, tin, copper or other metal, flipping fine drops into an opening near the bottom of a cylindrical combustion chamber The metal spray is blown upward, only the heavier drops falling back into the pool The cooling metal particles may be drawn off as such, or may be reacted with chlorine or other gases to form compounds

Science News Letter June 21 1947

MEDICINE

Million Dollars Spent To Test Streptomycin

➤ A MILLION dollars is being spent to test upon actual patients the mold chemical streptomycin, so far the most promising drug for chemical warfare upon tuberculosis

This raises to two million dollars the research grants by pharmaceutical companies to bring the drug from Dr S A Waksman's test-tube to the patient's bedside, John S Zinsser of Sharp and Dohme, Philadelphia, told the American Drug Manufacturers Association in Hot Springs, Va, in his presidential address

While leading medical men work with the National Research Council and the Trudeau Society in this streptomycin evaluation, other antibiotics may soon break forth from the laboratory, Mr Zinsser predicted

Other antibiotics that are promising include Subtilin, bacitracin and tomatin Penicillin is in wide usage Tyrothricin is in the early stages of clinical testing and limited use

In addition to such new drugs, medicine will find some of the almost discarded drugs return to new usage because of researches now in progress, Mr Zinsser also forecast

The future demand for insulin may outrun the present sources of supply, Mr Zinsser warned Due to this drug that controls diabetes, the diabetic now has a life expectancy only slightly less than the average for all citizens, contrasted with only six years of life for a person of 30 in the pre insulin era

Scientists and drug manufacturers are seeking new materials, new sources of pancreas from which insulin is extracted, and new processes for getting greater yields from present raw materials

Science News Letter June 21 1947

CHEMISTRY

New Process Obtains Maleic Acid from Furfural

➤ FURFURAL, that versatile chemical made from such agricultural wastes as corncobs and oat hulls, gets turned into almost everything nowadays Newest are maleic acid and its kin compound, maleic anhydride

They are produced by contacting furfural vapor at moderately high temperatures with a catalyst containing ammonia and its vanadium and molybdenum salts, preferably deposited on metal tubes Patent 2,421,428, issued on this process to Erik R Nielsen of Chicago, is assigned to the Quaker Oats Company

Science News Letter June 21 1947

MEDICINE

Lack of Vitamin A Found Related to Tuberculosis

➤ A RELATION between lack of vitamin A and susceptibility to tuberculosis, at least in rats and mice, has been discovered by Drs A B McCoord, C P Katsampes, E Day and S W Clausen of the University of Rochester School of Medicine

The stores of this vitamin in the tissues of mice are lowered by inhalation tuberculosis, the doctors reported at the meeting in Atlantic City of the American Academy of Tuberculosis Physicians

Rats that do not get enough vitamin A, they also found, are more susceptible to disease than rats with high stores of the vitamin Animals lacking vitamin A have bronchi that are broader and more irregular in outline than those of animals not lacking the vitamin, and evidences of pneumonia and bronchitis with inflammation are more evident

Science News Letter June 21 1947

INVENTION

Electrical Device Counts Words As They Are Typed

➤ WRITERS who do not like the tedious process of counting words in their manuscripts after they are typed will find the invention of Harold Chaskin of New York very useful It is an electrical attachment that counts one when any letter key is struck at the beginning of a word, then goes out of action until the space bar stroke indicates the end of the word It does not have the disadvantages of earlier word counters operated by the space-bar only, which would count words when the writer was only making extra spaces between sentences Three patents, Nos 2,421,681 through 2,421,683 have been issued on this device

Science News Letter June 21 1947

MEDICINE

Soilless Gardens Used To Probe Goiter Cause

➤ FOOD from chemical, or soilless gardens gives fresh evidence that lack of iodine can cause goiter Studies showing this were reported by Drs J F McClendon and Wm C Foster, of Hahnemann Medical College at the meeting in Atlantic City of the Association for Internal Secretions

In order to produce for the tests a diet free of iodine and to rule out any goiter causing influence other than iodine lack, these scientists grew the diet in a chemical garden in a disinfected greenhouse with disinfected water and chemicals in a goiter free region Air was pumped through a carbon filter

This diet was fed to six litter-mate rats from a colony that had not had any goiter for six years The rats were given the diet as soon as they were weaned

Three were given water redistilled from alkali to drink The other three were given water containing 10 parts per million of iodine These last three rats had normal thyroid glands

The other three, that got no iodine, at the end of 73 days had goiters four times as large as the thyroid glands of the rats that got the iodine in their drinking water

The goiters of the rats raised without iodine were twice as large as goiters in rats from a colony that ran to goiters living in a goiter region and fed a diet containing very little iodine

Science News Letter June 21, 1947

ENTOMOLOGY

Know Your Housefly Enemy

Fly would be gigantic if harmfulness were size. Its supreme ability to fly has helped it become one of our major disease-carrying enemies.

See Front Cover

By DR. FRANK THONE

If flies had physical size in proportion to their harmfulness they would be bigger than rhinoceroses—and a lot more formidable-appearing, too. Seen through the enlarging eye of even a low power microscope, a fly is a most fearsome looking object.

A full and detailed description of this dangerous animal would take a book. A quick glance at the principal things about a fly that make it such a menace to man is definitely in order. The more we know about our enemy the more effectively we can fight him.

One of Best Fliers

To begin with, the fly gets its very name because of its supreme ability to do just that fly. The common fly is one of the most efficient flying-machines in the world, far superior to birds and bats. The few insects that surpass it in the air are members of the same insect order—other species of flies. Compared with a fly man's most agile airplane seems clumsy. A plane can turn itself upside down, to be sure, and even cruise along that way for considerable distances, but what plane can land upside down on the ceiling and stick there? Yet a fly knows how to do that without teaching, as soon as it gets the use of its wings. As for quickness in takeoff, and ducking and dodging around in the air, no one who has ever swung a fly swatter needs to be told about these.

Entomologists list the fly in the order known as the Diptera, or two-winged insects. Members of that order have only one pair of wings, as contrasted with the two pairs possessed by most other insects. Where the second pair presumably used to be, in earlier evolutionary days, there is now a pair of short stalked projecting knobs commonly called balancers. That seems to be their function at any rate, if one of these knobs is clipped off the fly becomes unable to guide itself in the air, swerving crazily in circles. But so long as its normal apparatus is not interfered with, there's nothing can fly better than a fly.

The fly's landing gear—its six legs—presents a more intricate appearance than its wings, though like all efficient flying machines it uses them but little in getting about. It doesn't even need to taxi down to the end of a strip for a takeoff run. It just squats down a little, hops up, and is off. It is like a helicopter in that respect, though more like a fighter plane in speed and maneuverability.

Each of the fly's six feet is equipped with two little pads underneath. These have pores through which a sticky fluid oozes out. This is what enables flies to walk on the slipperiest surfaces, even when they are vertical or upside down. Legs and feet of the fly are also covered with an array of fine bristles. These serve as additional catchers for the filth in which the fly delights to wade—and then proceeds to walk around over your food, or the baby's nursing bottle.

The fly often grooms itself by rubbing its legs together, and licking them with its tongue cat fashion. That may clean its feet, but the germ-swarming stuff goes into its stomach, and is either regurgitated when the nasty little insect decides to make a meal off your sugar, or is dropped as a flyspeck almost anywhere. As an unconscious agent of bacterial warfare against mankind, the fly can hardly be improved upon.

FIGHTING FLIES—This aerosol bomb is effective against flies.

What is commonly called the fly's tongue has little resemblance to the tongue as we know it in larger animals. It consists of several distinct parts, set together to form a tube. It is through this that the fly regurgitates liquid from its stomach to dissolve its food, and then sucks it back up again. Very satisfactory for the fly, but not so good for us.

Housefly Can't Bite

Having to get its food entirely by liquefying it and then sipping it up as through a soda straw, the ordinary house fly cannot bite. Many persons, who have been most outrageously bitten by flies, especially just before a thunderstorm, will dispute this statement. But the flies that bite them are of other species that look more or less like the housefly, notably the stable fly and the horn-fly, which normally live around animals from which they can get the blood that is their usual food. When they sense a storm coming on, however, they are very apt to attempt the riskier venture of trying to fill up on human blood.

The only other notable features of a fly's head—indeed, covering the greater part of it—are its many-faceted compound eyes, that cover the greater part of its head. Under a strong magnifying glass their surface appears divided up into hexagons, like a honeycomb. This division holds throughout their structure, each eye is made up of hundreds of these six-sided prisms, tapering to narrow points at their inner ends where the sight-nerves are inserted, each with its individual lens at the outer end.

What the fly sees through these eyes is not certain, one would have to be a fly oneself really to know about that. However, it is probable that the fly's eye view of the world is more or less of a mosaic pattern, rather than a smoothly continuous one such as seen by the eyes of the higher vertebrates, including ourselves.

What is more important, especially from the fly-fighting angle, is the tremendous field of vision, very much wider than our own. A fly can see what is going on in front, on both sides, and to some extent even behind, so it is able to spot danger approaching from almost any point It interprets any movement of any object in its neighborhood as hostile, and takes off immediately

This very wide field of vision is what makes flies have such a preference for roosting on the ceiling, on projecting wall and door-jamb edges, and especially on hanging strings and wires From such vantage-points it can see in all directions Also, it has a choice of flight in all directions if anything threatens it

Knowing this tactical choice of the fly enables us to put DDT on just the places where the fly is most likely to settle

Science News Letter June 21 1947

HOW TO GET RID OF FLIES

DDT, best present weapon against flies, can be used to advantage in two different ways, for ordinary indoor applications

Use the handy aerosol mist bomb, which contains pyrethrum as well as DDT, for quick knockdown and sure kill of flies in a room Shut windows and doors, open the discharge valve, and swish the spray around for a few seconds Then leave the room and keep the door shut for about half an hour

Use a 5% solution of DDT in odorless kerosene to spray on ceilings, upper parts of walls, and other roosting-places of flies. Brush it on screen doors and window screens, frames and all This leaves an invisibly fine deposit of DDT crystals, which clings to flies' feet when they walk on it In an hour or less they become paralyzed and die.

You can buy this 5% spray ready mixed, or you get a concentrated solution of DDT in xylene, for dilution to 5% on your own workbench When using these sprays, be careful to extinguish all open lights and fires beforehand, and above all, don't smoke Mists and vapors of kerosene are inflammable

Spray the outside of the house around doors and other openings where flies try to get in Spray the dog kennel, chicken house and any other outbuildings where flies gather These residual sprays remain capable of killing flies for as much as five or six months after application

MEDICINE

Blood and Plasma To Be Available to All Soon

➤ BLOOD AND PLASMA which saved the lives of thousands of American fighting men in World War II may be available to all Americans anywhere in the country without charge within three to five years

Chairman Basil O'Connor of the American Red Cross announced the National Blood Program at the opening of the Red Cross convention in Cleveland

Explaining how modern medicine and surgery use blood in the treatment and prevention of disease as well as in the front lines of war Chairman O'Connor said his group's program has the support of medical and health leaders

The Red Cross will continue its wartime work in collecting blood donations Within three to five years, the program could make blood and plasma available throughout the country, Mr O'Connor predicted

Science News Letter June 21 1947

AERONAUTICS

Two Small Planes Used To Make One Big One

➤ MAKING a big plane out of two small ones, plus a stub winged glider, is the interesting invention of a former member of the Air Transport Command, O A Buettner of Pittsburgh, on which U S patent 2,421,742 has been granted Rights are assigned royalty free to the government

Recesses are sunk into the upper surfaces of the glider's truncated wings One wing of each of two fighter planes is latched into these recesses, linking all three together as one large craft The glider can be used for transporting troops or supplies, or it can be made into a huge fuel reservoir, enabling fighters to accompany bombers on long raids, so that they can go into action with their own tanks full after jettisoning the emptied glider

Science News Letter June 21, 1947

CARTOGRAPHY

Map Measuring Distances And Areas in Terms of U. S.

➤ HOW FAR is it from Omsk to Tomsk? Are the Urals longer or shorter than the Alleghenies? How big is Baluchistan? Questions like these can be answered in terms of U S A distances and areas by means of a new globe on which Homer V Johannsen of Chicago has received patent 2,422,101 Along with the globe, mounted on a curved rod, is a map of the United States on the same scale and degree of curvature It can be superposed on any part of the globe for comparison purposes

Science News Letter June 21 1947

MEDICINE

Multiple Sclerosis Produced in Monkeys

➤ PATIENTS suffering from the "brutal" and always fatal disease, multiple sclerosis, are getting an answer to their plea, "Why doesn't someone do something about this disease?"

Someone has done something Dr Elvin A Kabat and associates at Columbia University and the Neurological Institute in New York have found a way to produce the disease in monkeys and a clue to the cause of the disorder

To help them push their research further, with the ultimate aim of finding a cure or preventive or both, the Association for Advancement of Research on Multiple Sclerosis has just made its first grant of $64,350

The Columbia doctors found they could produce the disease in monkeys by injecting a bit of the animal's own brain tissue into their bodies This has led to the theory that in human patients accidents or germ diseases might cause a tiny bit of the brain tissue to be dislodged and start travelling through the body in the blood stream

When this happens, if it happens, the body would react to it as it does to any foreign protein substance Familiar examples of reaction to minute amounts of foreign protein are the allergies such as hives, hayfever and migraine headaches Multiple sclerosis is believed, on the basis of the monkey experiments, to be the result of such a reaction, which doctors term the antibody antigen reaction

Science News Letter June 21 1947

Do You Know?

Cotton *linters* are being used in papermaking to meet a shortage in rags

Apply two thin coats of *shellac* rather than one thick coat, experts advise

Rags used in making high-grade white *paper* must have all color dye removed before processing

Cincinnati prohibits *smoking* in elevators and in all retail stores employing 25 or more persons

Danger from whirling electric *fans* is lessened if they are painted red or yellow to make them conspicuous

Smoke from a diesel engine can be due to overload, wrong fuel, too early or too late fuel injection, or too low or too high compression

Insulated *aluminum* wire, developed for use in airplanes because of its lightness, is now being used in place of copper in many installations

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AGRICULTURE

Soybean to Feed Livestock

In midwestern regions, where rains harmed the corn crop, the soybean will go to the rescue for livestock feeding. Scientists are doing research on it.

➤ THE SOYBEAN, that versatile vegetable that is probably the Orient's most valuable gift to Occidental agriculture, may do a rescue job in parts of the Midwest where May frosts and June flood-rains either prevented corn planting or drowned what was planted Even if the beans do not mature, the crop can be cut green and either dried for hay or put into the silo, providing something for live stock to eat

Soybeans were used as a catch crop in the Midwest half a generation ago, when heat and drought brought to grainfields the disaster that is now threatened by recent cold and present wet During the mid thirties, drought not only discouraged grain growth, it encouraged a double plague of grasshoppers and chinch-bugs

The latter were especially bad, they moved like a crawling carpet, and when they struck a growing field the young grain went down as before a fire

Knowing that chinch-bugs attack only grains and grasses, farmers plowed up their ruined grainfields and planted soybeans, even after mid June Thus a desperate situation was prevented from becoming wholly hopeless

Expansion in Planting

This emergency brought about the greatest expansion in soybean planting that the country has ever seen In Iowa, for example, the acreage devoted to the crop during the first of the really bad drought years was between seven and eight fold that of the previous year Having thus been roughly introduced to the soybean, the farmers found the acquaintance profitable and have faithfully continued to cultivate it

Agricultural scientists are giving the soybean the attention merited by the friend in lean years that becomes a source of wealth in better times At Urbana, Ill, a U S Department of Agriculture plant pathologist, W V Allington, is applying wartime observation methods to the finding of enemies of the soybean Flying his own light plane above soybean fields, he takes air photographs that show up fields infested with a fungus disease, brown stem rot, as lighter areas than the healthy, dark green fields Location of the infected fields indicates that farmers who plant soybeans several years in succession are simply exposing their seed to soil where the fungus lurks

A minor but widely known use of soybeans is in the production of the salty, tangy sauce, often called "dragon's blood", that you get with every serving of chow mein or chop suey The Department's Northern Regional Research Laboratory at Peoria, Ill, now has four certified strains of the microorganisms used in fermenting this soy sauce They are two molds, a bacterium and a yeast They are to be maintained in pure culture, to supply any manufacturer of soy sauce whose own stock cultures have become contaminated with "wild" organisms floating in the air

A Chinese scientist, Pei Sung King of the Chinese government's National Bureau of Industrial Research at Chungking, aided in the selection of these strains As a guest worker at the Peoria laboratory, he suggested various methods of soy sauce fermentation which his American colleagues tested and compared in working out the method they now recommend to manufacturers in this country

Department of Agriculture chemists have worked out an extraction method that uses ethyl or grain alcohol to get the oil out of ground up soybeans, instead of the light petroleum fractions hitherto in use

Science News Letter June 21 194

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MEDICINE

Cancer Treated With Gold

➤ CANCER and leukemia patients are now being treated with radioactive gold from the chain reacting uranium pile that created the atom bomb

"Results in chronic cases (of leukemia) have been equally good if not better than results obtained with X rays," Dr Paul F Hahn, associate professor of biochemistry at Vanderbilt School of Medicine, declared at the isotope conference in Nashville The conference was held at Vanderbilt University in cooperation with the Clinton Laboratories and the Oak Ridge Institute of Nuclear Studies Leading scientists have discussed use of radioactive chemicals as tracers and in treatment of disease

A total of 33 leukemia patients and 30 miscellaneous tumors have been treated so far Favorable results have been obtained in leukemia of the chronic variety only

Two leading advantages of the treatment over X rays, Dr Hahn said, are the lack of radiation sickness and the simplicity with which the radioactive material is given

In leukemia, the radioactive gold is injected into the patient's vein In the case of a tumor or cancer it is injected into the tissue so as to infiltrate the tumor with the radioactive material Time in hospital and expense are saved The treatment can be given in a few minutes and the patient can then go back home or to work if necessary

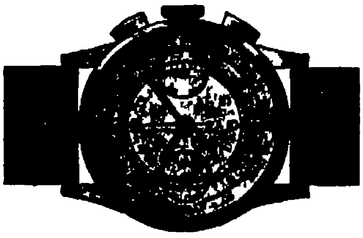
It costs only about $5 for enough radioactive gold to produce a "satisfactory remission" or temporary improvement such as X rays give, in certain types of chronic leukemia

When the radioactive colloidal gold is infiltrated into tumors, it remains fixed at the site where it was deposited The tumor is then constantly bombarded with rays from the radioactive gold, something as is the case when a radium needle is deposited in or near the tumor for a time The use of radioactive gold, however, eliminates many of the undesirable features accompanying the use of radium under similar circumstances, Dr Hahn said

Dr Hahn and his assistant, Dr C W Sheppard, have been conducting a cancer and leukemia treatment program for the past 20 months At first they used radioactive colloidal manganese made in the cyclotron This had the disadvantage of a relatively high cost When material from the uranium pile became available, they shifted to use of radioactive colloidal gold This decreased the cost of treatment to about two per cent of the former cost

Vanderbilt University's nearness to the uranium pile at Oak Ridge makes it a logical center for work of this kind, Dr Hahn pointed out At present Vanderbilt is receiving more radioactive material from Oak Ridge than any other medical school in the United States

Science News Letter June 21 1947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AGRICULTURE

Illinois Introduces New Lincoln Hybrid Soybean

➤ ILLINOIS has had the honor of introducing a new hybrid soybean, appropriately named for her most distinguished citizen, Abraham Lincoln The Lincoln soybean averages three bushels per acre better than other soybeans, and the beans themselves contain one half per cent more oil It is therefore claiming increasingly greater acreages for itself, though it was introduced only five years ago

Science News Letter June 21 1947

AERONAUTICS

Radar Equipment to Give Safety from Mountains

➤ SAFETY TO airplanes from mountains ahead is promised by new airborne light weight radar equipment which will be in production by 1948, Comdr W C Hilgedick, U S N, told the joint meeting in Washington of the International Scientific Radio Union, American Section, and the Institute of Radio Engineers

This radar equipment, which weighs 150 pounds, can be used effectively in dodging bad weather ahead, such as thunderstorms and conditions favorable to the formation of ice on the plane It can be used also in beacon navigation, beacon low approach for landing, and to avoid collisions in the air with other planes For the last purpose, however, its usefulness is limited because radar echoes from another plane are weak and easily unnoticed

The new equipment is built on specifications prepared by the Army, the Navy, and American Airlines, serving as consultants The object sought was the most desirable type of radar for transport aircraft The instrument which the Navy expects to have in production early next year will be known at the AN/APS 42 equipment

For terrain clearance a pencil beam is used, Comdr Hilgedick stated This circles around the aircraft like a searchlight, and in effect presents a safety circle within which no echo should be received without danger On the radar scope, the pilot has at a glance a picture in overcast weather as quickly and easily understood as if he looked through a windshield on a clear day

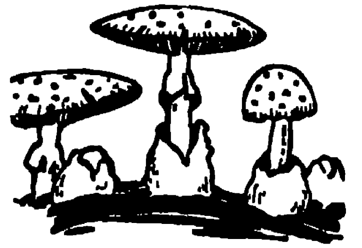
The beacon navigation program of the Army and Navy includes installations up and down both coasts and across the southern overland route These beacons are coded and can be flown across the face of the radar scope just as clearly as flying a searchlight beacon course in good weather In the beacon low approach, two small beacons are used, one at each end of the runway This allows a pilot to line up with the proper runway before let-down

Science News Letter June 21 1947

BOTANY

NATURE RAMBLINGS

by Frank Thone



Mushrooms are Toadstools

➤ THERE IS NO sure way of distinguishing between mushrooms and toadstools, simply because there is no distinction between them. Mushrooms are toadstools and toadstools are mushrooms. Both names are words descriptive of a plant of a certain shape. Any fleshy fungus with a cap and a stalk is a mushroom. It is also a toadstool. The common field agaric, which is the only species cultivated and sold, is an edible toadstool. The fly-agaric, so called because a sweetened decoction of it was formerly used as a home made fly-poison, is a deadly mushroom. To parody Gertrude Stein just once more, a mushroom is a toadstool is a mushroom.

If you're going out a-gathering mushrooms, you will of course want to know which ones are good to eat and which are poisonous. Regrettably, there is no easy rule of thumb test for toxicity in mushrooms (or toadstools).

The old one about mushrooms with white gills being safe and those with black gills being poisonous is just about as far from the facts as it can get. The ordinary mushrooms of the market have black gills when they become mature, and so do the even tastier wild inky cap mushrooms—as indeed their name indicates. On the other hand, the genus Amanita, which has only one edible species, all the others being extremely poisonous, is innocently white underneath all the days of its brief life.

Other tests, like turning a silver spoon black, and easy peeling of the skin off the cap, are equally unreliable. One test, which classifies as poisonous all mushrooms with loose scales on the cap, is good as far as it goes, for loose scales, remnants of the veil that hangs at mid-stalk, are one of the marks of the Amanitas. But there are other poisonous genera that do not have these scales, moreover, a heavy rain sometimes washes the scales off an Amanita cap, leaving it smooth and glistening.

No, the only way to tell poisonous from edible mushrooms is to learn how to identify them, species by species. That is less work than you might think, thanks to the widespread interest in the subject there are several good books for the amateur mushroom hunter, and a considerable number of useful pamphlets, published by state agricultural experiment stations, museums, and so on. Armed with one of these, and using reasonable caution you can get many a tasty food treat free—which is something of a feat, these days.

Science News Letter, June 21, 1947

AERONAUTICS

"Mudder" Planes Tested With Track-Type Gear

➤ SOME PLANES in the future, like some horses, are going to be good "mudders."

A tractor track of the endless belt type will be installed soon on the landing gear of an Army cargo plane to test its ability to permit aircraft to land on soft dirt, mud or sand. It is a track similar to that used on caterpillar tractors.

The installation of this track type landing gear will be on a Fairchild C-82 Packet, a twin-engine, 54,000-pound transport originally designed for use on short, unimproved fields. It has a large rear door through which heavy equipment can be loaded into its box-car like body.

The idea is not entirely new. Track-type landing gear has already been tested on Douglas A-20's. It is now being adapted to the heavy plane. The installation will provide a wide tracked surface on the nose and each main gear, all three to be retractable in the same manner as conventional wheel landing gear.

Science News Letter, June 21, 1947

PSYCHIATRY

One Out of 140 Americans Is Perfect But Boring

➤ ONE out of every 140 Americans is perfect, Dr. Earl D. Bond, University of Pennsylvania professor of psychiatry, estimates.

The one million perfect persons in our midst have no anxiety, no fears, no prejudices, no attractive vices, no weaknesses. They will probably live long.

But you probably won't envy them even if you are one of the two and one half million neurotics or one of the 133 million Americans unnecessarily handicapped by too much conscience or struggling with feelings of inferiority. For here is how Dr. Bond described them to life insurance medical officials meeting in Ashville, N. C.

Like the few completely insane people they are not interesting. They don't seem human. They are all perfect and well rounded, "like a string of zeros."

Science News Letter, June 21, 1947

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CORALS FROM THE GULF OF CALIFORNIA AND THE NORTH PACIFIC COAST—J Wyatt Durham—*Geol Soc of Am* Memoir 20, 68 p, illus, $1 70 Thirty seven species of coral from this region are described and discussed This includes 14 new species and six genera not previously recognized here

A GLOSSARY OF MOLLUSCAN TERMINOLOGY—Paul H Reed—*pub by the author,* 30 p, paper, $1 Compiled by the author from his library, and acknowledged as preliminary

RADIOACTIVE TRACERS IN BIOLOGY An Introduction to Tracer Methodology—Martin D Kamen—*Academic Press,* 281 p $5 80 This text to provide a review of the concepts of nuclear physics for biologists, to present a critical survey of existing tracer methods, and to indicate both potentialities and limitations of these methods will serve to bridge the comunications lag between new developments and those not immediately connected with them

RECLAIMED RUBBER The Story of an American Raw Material—J M Ball—*Rubber Reclaimers Assn* 248 p, illus, $5 A history of this industry and the important part it has played in our national economy

THE RISE AND FALL OF THE MIDDLE KINGDOM IN THEBES—H E Winlock—*Macmillan,* 174 p, illus, $5 A reconstruction of the period from the Eleventh through the Sixteenth Dynasties from the scanty available evidence

WESTWARD HOW! Through the Scenic West—Fred Bond—*Camera Craft* 324 p, illus $6 95 This book for camera fans, plans numerous routes for driving through different sections of the Far West so that the visitor may make the best of his time and see all the majestic scenery en route Complete descriptions of the various types of places to visit and photographs showing samples of the scenery add to its usefulness

WILDCAT CARTRIDGES—Richard F Simmons—*Morrow,* 333 p, illus $5 An analysis of over 200 experimental cartridges produced by handloaders and gunsmiths Most of the present popular and efficient standard cases started out as wildcats

Science News Letter June 21 1947

PSYCHOLOGY

Athletics for Development

➤ PSYCHOLOGICAL kinks which often develop in men deficient in physical ability might be avoided if more attention were devoted in childhood and adolescence to improving skill in athletics

This is one of the conclusions of a study of 17 year old boys by Dr Harold E Jones, director of the Institute of Child Welfare at the University of California

The present system of physical education is excellent for producing championship athletes, Dr Jones asserts, pushing to ever greater heights the performance of those well endowed physically

But there would be many psychological as well as physical advantages, he believes, to a system of physical training directed more especially towards those who are of sub-average physical ability

Prowess in athletics is one of the chief sources of prestige among adolescent boys, and this is partly related to the fact that strength and other aspects of physical ability are closely joined to such favorable traits as activity, aggressiveness, and leadership

"Under present conditions many of those who most need training become spectators,' Dr Jones states, 'and those who least need it become performers If physical education is to be judged in terms of its success with those who have greatest need, that is, with those who are naturally less proficient, some question may justly be raised as to the adequacy of the methods now in effect

"A program more specifically and more intensively adapted to individual needs should compensate, to some extent, differences due to biological factors, and enable the physically less gifted to compete on somewhat more even terms with those having initial physical advantages

"It is idle to expect differences to be eliminated or even very greatly reduced, but at least we might achieve a system in which these differences are less vigorously promoted"

Science News Letter June 21 1947

Bentonite *clay* has peculiar physical properties such as swelling and slipperiness when wetted, it is used to stop seepage in ponds and reservoirs because after once thoroughly wet these properties prevent further penetration of water

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✻ *WINDOW SCREEN that eliminates sun-glare, interferes very little with the view when looking out but does limit the view from the outside looking in Resembling somewhat a Venetian blind, it is made of tiny one inch long slats of aluminum or bronze, placed close enough together to keep out insects*

Science News Letter June 21, 1947

✻ *NYLON-SHAFTED screwdriver is an insulated tool for use with electronic equipment and in other electrical work The shaft is rigid and strong is heat-resistant and does not absorb moisture Made of nylon, it will not mar soft metals*

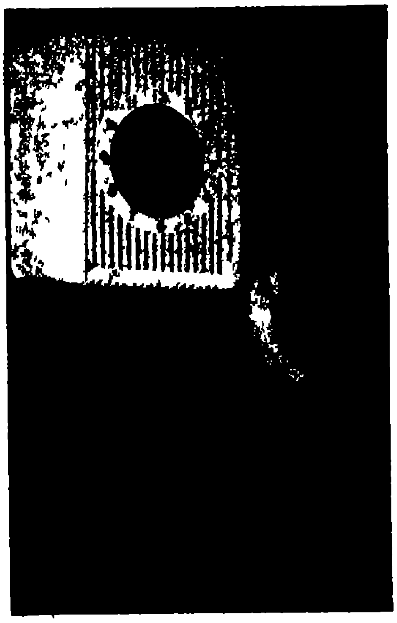
Science News Letter June 21 1947

✻ *DIAL MARKINGS in automobiles are plainly visible at night without glare when "lighted" by infra red rays which activate fluorescent paint on them A standard six volt bulb is used, but it is employed in connection with a filter which eliminates the high reds from the spectrum*

Science News Letter June 21 1947

✻ *SLEEPING COVER for baby, recently patented, is the size and shape of the crib, and has a T-shape opening through which the infant's body is placed underneath A jacket above the opening is fitted over the arms and chest*

Science News Letter June 21, 1947



✻ *RADIO-CLOCK combination is housed in an attractive plastic casing arranged either to stand on a table or hang on a wall The electric clock, placed in the center of the case, as shown in the picture, cleverly conceals the radio*

Science News Letter June 21 1947

✻ *REPLACEMENT tapes for Venetian blinds are slipped into place over the ends of the blinds as they hang in the windows, and the soiled tape removed by cutting A fastening device holds the new tape in position*

Science News Letter June 21, 1947

✻ *DRILLS for boring holes in glass are now available with carboloy cemented carbide cutting tips As many as 1,000 holes can be made without resharpening, it is claimed This tip, not as hard as a diamond but the hardest metal made by man, can be sharpened on a special silicon carbide wheel*

Science News Letter June 21 1947

✻ *FISH-LANDING NET, recently patented, is similar to the ordinary kind used by sportsmen but has a flashlight built into the handle with its lens adjacent to the loop frame of the net A beam of light may be directed centrally across the frame*

Science News Letter June 21, 1947

★ SCIENCE SERVICE BOOK SELECTION

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by Calvin N. Mooers and Charlotte Davis Mooers

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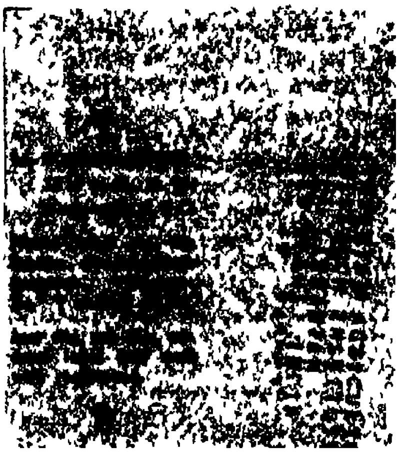


Question Box

AERONAUTICS

How can one plane be made from two small ones? p 395

CHEMISTRY

How can nitrogen be fixed as nitric oxide without electricity? p 392

ENTOMOLOGY

How can you get rid of flies? p 395

How does the housefly get its food? p 394

MEDICINE

How can stomach cancer be detected in its early stages? p 387

How is lung cancer distinguished from tuberculosis? p 388

What is the two-hour test for pregnancy? p 388

What new developments may enable doctors to tell what emotions wear out the heart? p 390

What special medical use have soilless gardens? p 393

ZOOLOGY

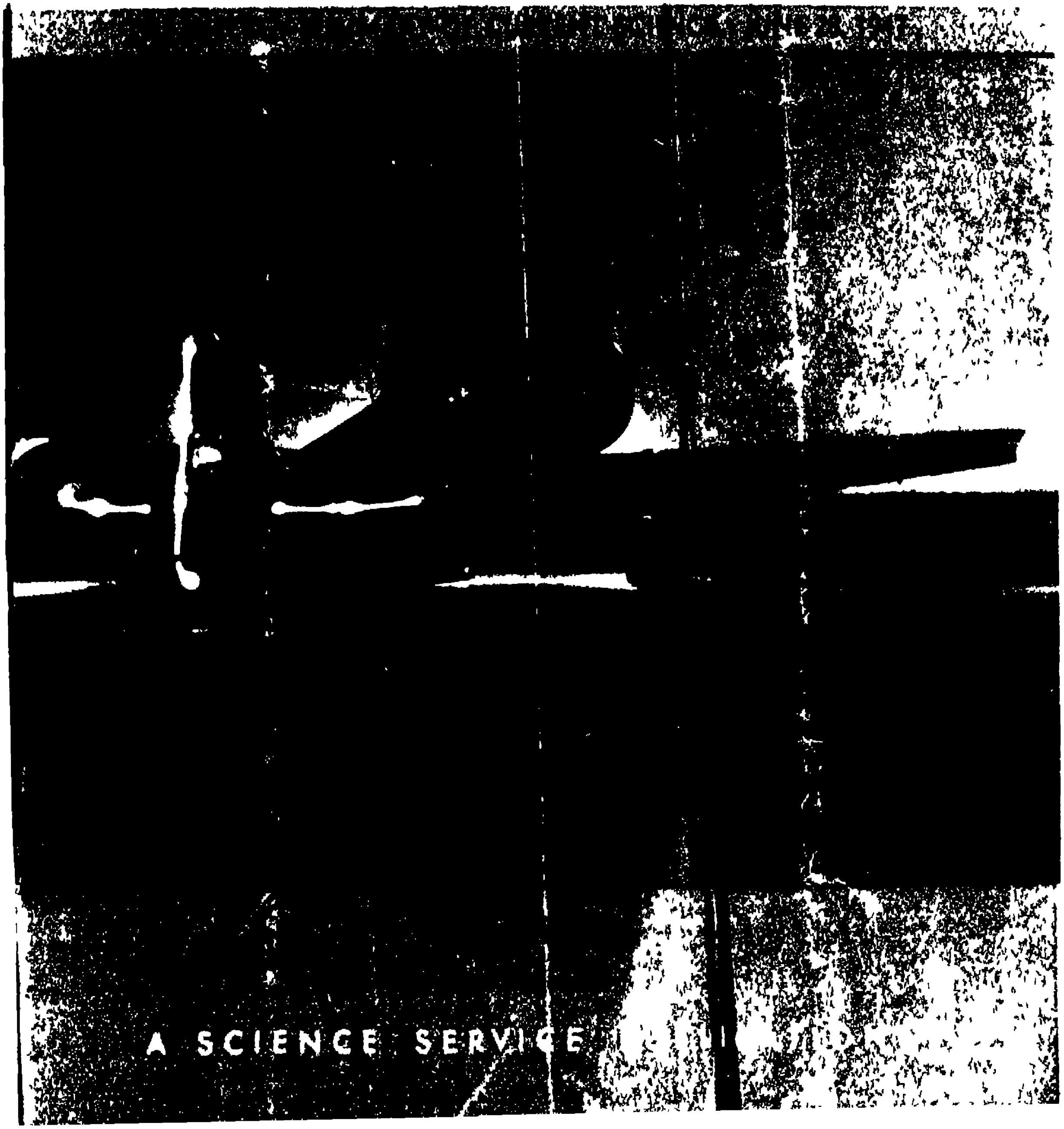
What West Indian rodent can climb trees? p 389

Pictures: *Cover, U S Department of Agriculture, Lincoln Park Zoo, p 389, Carnegie Institution, p 391; Westinghouse, p 394*

Where published sources are used they are cited

INDEX

SCIENCE NEWS LETTER



A SCIENCE SERVICE [illegible]

AERONAUTICS

Lighting for Safe Flying

The Navy is experimenting with light to improve night vision for pilots and prevent illusions that cause crashes. Both outside and inside lighting being tested.

See Front Cover

➤ SAFER NIGHT flying may result from lighting experiments on three planes at the Navy's Aero Medical Equipment Laboratory in Philadelphia

Inside and outside lighting of planes are under experiment to overcome some of the hazards of night flying The outside plane lighting is designed to keep pilots from becoming confused by ground lights, stars and other planes Inside the planes, experimental lighting is being tested to help the pilot retain his visual night adaptation

Main job of the outside lighting is to warn pilots of another plane and indicate the direction the plane is flying One student pilot cracked up when he mistook the dim headlights of a truck on the ground for another plane Other pilots have been confused by stars

A three quarter stern view shown on the cover of this SCIENCE NEWS LETTER is of an experimentally lighted plane with illuminated lucite outlining the tail and wing tip, showing how the plane would appear to a pilot flying in close formation

Experimental lighting tested at this laboratory has included the flashing lights used by commercial planes Another outside lighting for planes in the experiments uses illuminated plastic bars on the wing tips, trailing edges of the vertical rudder and the horizontal elevator of the tail A third system uses direct illumination of some sections of the plane

One problem faced in the study is autokinetic illusion This causes a person looking at a single, fixed point of light in the dark to think the light is moving This illusion has caused plane crashes A row of lights on a plane or a bar of illuminated plastic can overcome this illusion, the tests have found

Rows of lights and direct lighting of sections of the plane will also give easily identified light which indicates the direction of flight Other tests have shown the flashing lights of commercial planes to be effective for night flying

Lighting experiments inside planes have used red and ultraviolet lighting for panel boards to overcome "night blindness' "Night blindness" is caused when a pilot, who has accustomed his eyes to the darkness outside, looks at a bright light inside the plane He is unable to see as well immediately afterward when he looks out into the darkness again

Three planes at this Navy laboratory have been equipped with experimental lighting installations for the lighting tests The study is under the direction of Capt John R Poppen

Science News Letter, June 28, 1947

MEDICINE

Surface Infection Drug

➤ A "LITTLE brother", to penicillin, capable of replacing that drug against surface infections and with some advantages over it, has been developed and tested, though it is not yet ready for wide use in treatment and research

The new antibiotic, a modified form of gramicidin, has been used successfully in the laboratory at the University of California Medical School to control bacteria which invade body surfaces

Of greatest importance is the fact that gramicidin apparently does not cause sensitization, that is, severe systemic reactions after repeated use This means gramicidin can be used repeatedly in surface infections without destroying its efficiency

For this reason it will be complementary to penicillin, which does cause sensitization Many doctors have critized the use of penicillin in minor infections on the grounds that sensitization will prevent its later use in major ailments

With gramicidin as a potent weapon against body surface infections, penicillin could be reserved for occasions when it may save a life

Results with gramicidin were reported by Dr Hamilton H Anderson, professor of pharmacology in the University of California Medical School The gramicidin derivative used was developed by the Western Regional Research Laboratory, U S Department of Agriculture, Albany, Calif, and tested by Drs Sam C Wong and Y C Chin, associates of Dr Hamilton

Gramicidin, in its original form, was too toxic for use, in that it destroyed red blood corpuscles Another handicap was the difficulty of dissolving it in water

Wetting agents were used in combination with gramicidin and subtilin, another antibiotic useful in killing body surface bacteria These agents distribute the antibiotic uniformly over tissues and disperse the organisms which might tend to clump and be unavailable to the drug

Dr Anderson said that detailed pharmacologic studies are necessary before gramicidin and subtilin can be widely used in research and treatment He also described experiments in which subtilin killed tuberculosis germs in the test tube

Science News Letter, June 28, 1947

AGRICULTURE

Better Silage Made From Wilted Plants

➤ DID YOU EVER eat the old fashioned salad known as wilted lettuce? To one who has never experienced it, the name sounds pretty awful, but the dish has its devotees

A cow-barn analogue now seems to have been developed by two scientists of the U. S Department of Agriculture, T E Woodward and J B Shepherd They have found that if the grasses, legumes and other plants that are to go into the silo are first wilted until their moisture content stands between 58% and 68% and then cut very fine, the resulting silage will be more nutritious and better relished by the cows If the weather is too damp for the wilting process when the silo is being filled, addition of from 5% to 15% of dry hay will turn the trick

A big saving in both cash and labor is effected by the pre-wilting process For many years it has been othodox practice to add acid to the silage, either directly or by the addition of molasses or the like, which produced acid by fermentation With the wilting method, this acidification has been found unnecessary

Science News Letter, June 28, 1947

22 MA
New Delhi

CHEMISTRY

Artificial Protein Fibers

Synthetic meat better than beefsteak and fabrics silkier than silk may result from this major advance in organic chemistry.

➤ THE ARTIFICIAL manufacture of protein fibers announced at Harvard promises

Synthetic meat better than beefsteak

Chemical germ fighters better than penicillin and streptomycin

New factory-made textiles silkier than silk

And a new approach toward building artificially the chemical structures which are the basis of life

This is what Dr Robert B Woodward, Harvard's 30 year old chemist, did

He linked together by the thousands the simple nitrogen containing structures (amino acid anhydride molecules) He made the first successful synthesis of fibrous protein molecules as complex as those in the living human body or other living structures He induced protein molecules to polymerize (join one to another in long chains) in much the same way that hydrocarbon molecules polymerize to form synthetic rubber

Artificial Antibiotics

Already artificial compounds like some of the germ-killing substances produced by soil bacteria have been made in the Harvard laboratories The new artificial antibiotics are promising in chemical structure and similar to the natural gramicidin, tyrocidin and bacitracin germ killers But they are too recently made to be tested yet in actual germ-fighting

Giant protein molecules in thick and viscous solution have been squirted through a hypodermic needle into the air to make a silk thread, the way a spider does it Thin films of the new plastic have been made—first of a new protein family of plastics that may become as well known as rayon, nylon and cellulose sheeting

Dr Woodward found that previous experimenters were on the wrong track when they expected protein molecules to link up by losing water Loss of carbon dioxide allows the linkage in the newly-discovered process

In the description published in the Journal of the American Chemical Society (June), Dr Woodward and his associate, Dr C H Schramm, tell in formulae their method of growing the fairly simple amino acid anhydrides into complex polymers in the chemical solvent, benzene, with a very small amount of water to start the reaction Throwing off carbon dioxide, the molecules join in long chains that can weigh a million times the hydrogen atom—a size that has never before been achieved in artificially made protein

The door has been opened by these researches to the study of complex protein products basic to life itself A new chemical view of blood, meat, milk, hair, fingernails, and thousands of other things in the animal body is now possible The new synthesis may bring us closer to synthesis of protein or meat like food from inorganic or non agricultural materials

Dr Woodward worked out a synthesis of quinine in 1944, but this chemical manufacture of the anti-malarial chemical was too complex to be practical However, his new fibrous protein synthesis appears to be capable of development with important possibilities in biology medicine, plastics and technology

Science News Letter June 28 1947

BACTERIOLOGY

Small Germ Discovered; Named After Big Texas

➤ TEXAS has received a new distinction which even the most zealous of Texans may not appreciate The Lone Star State has had a germ named after it *Salmonella texas* It is very small germ, at that

The new species was isolated by U S Public Health Service workers from the digestive tract of a four year-old boy in Hidalgo county, whose mother said he had been having abdominal pains and diarrhea for about a week It is described in *Public Health Reports* (May 30) by Dr James Watt, surgeon, and Misses Thelma M DeCapito and Alice B Moran, bacteriologists

Science News Letter June 28, 1947

PROTEIN MAKER—Robert B. Woodward, associate professor of chemistry at Harvard University, discovered the synthetic protein analogy. He is holding a model showing the structure of molecules common to proteins such as hair, muscle, silk and fur and his new synthetic substances. The balls marked "X" and "Y" show the elements which are not the same in every protein and cause the difference in their properties.

MEDICINE

Radar for Healing Sick

Waves can be used for heating living tissues and may be superior to the methods now used. It can be beamed and localized like spotlight.

➤ RADAR, famous for its use in military aviation, is now going to be used to heal the sick. Experiments showing its potential value in medicine are reported by Drs. Frank H. Krusen, J. F. Herrick, Ursula Leden and Khalil G. Wakim, of the Mayo Foundation in Rochester, Minn.

It will be used to heat living tissues in conditions where that is desirable. Shortwave diathermy is now used for this purpose. Radar will be better for this purpose for a number of reasons, the Mayo scientists believe.

Radar can be beamed and localized like a spotlight, which will make its medical use easier. The patient will be free to move away from the radar director at any time. Freedom from pads, encumbering cables and toweling commonly used with shortwave diathermy will permit more rapid cooling of the skin, which constitutes another advantage of radar.

The medical use of radar was under investigation years before the war. It had not then been given its name, radar, but was known as microwave therapy or microkymatotherapy. Starting in 1937, Dr. Krusen and associates were in correspondence with various physicists about the then newly discovered electromagnetic waves that could be focussed and made to travel along tubes. By March of 1939 they had learned of the Klystron tube and, as Dr. Krusen relates, thought that at last they had tracked down a tube of large enough wattage to provide radiation of sufficient power for medical use.

"But suddenly all such tubes became mysteriously unavailable. We could never obtain a Klystron or a magnetron tube. We were greatly puzzled during the years that followed and during the early part of the war concerning our inability to obtain a microwave tube just when tubes of sufficient power were becoming available.

"It was not until the secret of radar was finally revealed that we realized that all such tubes had been frozen for military use and were being employed for this secret wartime development."

Details of the studies preliminary to medical application of radar are reported in the proceedings of the Staff Meetings of the Mayo Clinic (May 28).

Science News Letter, June 28, 1947

ENGINEERING

Ore Separation Process Uses Centrifugal Force

➤ INDUSTRIAL operations that depend on separating light particles from heavy ones, such as ore flotation and coal sorting, are now offered the benefits of centrifugal force, long familiar in the cream separator. A machine embodying this principle, invented by H. L. McNeill of Denver, has been covered by U. S. patent 2,422,203.

The mixture of light and heavy particles, as it comes from the grinding mill, plus water and whatever pulp is used to facilitate separation, is discharged into a conical or cylindrical chamber, within which a correspondingly-shaped rotor is spinning. Light and heavy particles, thrown outward from the rotor, form two zones, the lighter within and the heavier without. Heavy particles settle to the bottom and drop out through a central opening, light ones float to the top and find there an appropriate discharge spout.

Science News Letter, June 28, 1947

CHEMISTRY

Blame Soap Molecule If Shaving Cream Hardens

➤ BLAME THE SOAP molecule if your shaving cream hardens in the tube or your cosmetics turn to a rubbery jelly.

That is the verdict of chemists, reported to the American Chemical Society's National Colloid Symposium held at Stanford University.

The soap molecule is the villain to blame for deterioration of greases or ointments, Todd M. Doscher and Robert D. Vold of the University of Southern California explained.

Shaped like a pencil, the soap molecule has one end which is soluble in oil, while the other end is soluble in water. Lubricating grease, ointments and such products as shaving cream and cosmetics are mixtures of these pencil-shaped soap molecules with water and oil.

If there is too little water, then the soap molecules form a tight network which forces out the oil. If there is too much water, the oil and water form an emulsion which will ruin a lubricant.

The remedy, the chemists explained, is correct proportions of soap, oil and water. Creams, greases and ointments have been made by rule of thumb methods, they charged. Like cook-book recipes, the formulas do not always work.

More scientific study by chemists may solve some of the problems.

Science News Letter, June 28, 1947

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BALLISTICS

U. S. Research on Rocket

Scientists are developing a better missile than the V-2. Smaller rockets are being tested to give data. Guiding missile is big problem.

➤ THE GREAT American rocket, a "made in the U. S." missile superior to the famous German V-2, is being developed step by step by the U. S. Army.

The rocket is not yet under construction. It is not even completed on the drawing board. Plans for the rocket will come from a mass of scientific data and observations collected from perhaps thousands of rocket firings with other missiles.

Stepping stones toward America's postwar answer to the V-2 are the smaller missiles being built and tested by the Army. These incorporate new designs and specialized parts. If some of these innovations stand up under tests they may be incorporated into future rockets.

More experiments aimed at the development of the all American rocket are being conducted with V-2's fired at White Sands, N. Mex.

Army rocket experts are not talking about the end product of these experiments. One guess is that an American super-V-2 may be unveiled within a year from now. If it is ready by next spring, the new rocket will have to be tested at a new shooting ground.

The V-2 firing site at White Sands, with a 90-mile range, is even a bit small for the V-2, as the Army found out a few weeks ago when a Nazi missile strayed into Mexico. This means that a new and untested rocket, as large or larger than the V-2, will probably not make its debut on the famous sands near El Paso.

One of the biggest problems in building a better rocket than the V-2 is in the gyroscope, which steers the missile. The Germans had trouble making the rocket go where they wanted it to. The V-2 that landed in Mexico also revealed the difficulty in keeping the weapon under control once it is fired.

An American-built device for tilting the gyroscope in flight is the first step toward control of the rocket by radio from the ground, the dream of all missiles designers.

Another step ahead of the V-2 has been achieved by the Army. This is a simplified fuel piping system, planned to do the job of the complicated mass of pipes on the Nazi rocket.

Newest of the smaller missiles being tested by the Army are the WAC B and the Corporal E.

The WAC-B is a new version of the WAC Corporal rocket, built in this country during World War II. A feature of the new rocket is a light weight sheet steel motor construction, compared with the forgings and castings of other rockets.

Less is known of the Corporal E, which is reported to have been fired successfully at White Sands. The Army just isn't talking about this one yet, but it is believed to be another of the small experimental rockets which will help develop the great American rocket.

Science News Letter, June 28, 1947

ASTRONOMY

New Comet Discovered Near Sagittarius and Libra

➤ A NEW COMET, barely visible through a five-inch telescope, has been discovered in the southern evening sky by a Russian observer and reported to the Harvard College Observatory.

The comet has been named Jakovin Junior, after its discoverer. It was first spotted near the constellations Sagittarius, the archer, and Libra, the scales. The comet was north of the star, Antares, in the constellation Scorpius, the scorpion. The new comet was reported moving northward.

Science News Letter, June 28, 1947

ENGINEERING

Char from Coal Suitable For Powder Burner Use

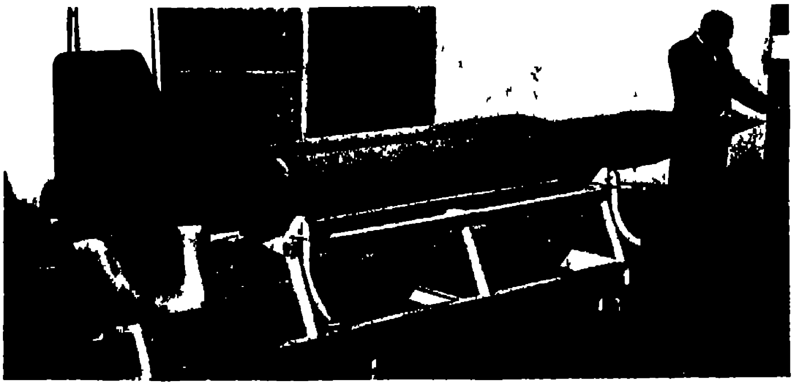
➤ A PRODUCT of coal called char can be pulverized finer than raw coal and is therefore suitable for fuel in powdered fuel burner installations, the American Society of Mechanical Engineers was told by A. D. Singh of Chicago and L. J. Kane of the U. S. Bureau of Mines.

Both these men were formerly associated with the Institute of Gas Technology in Chicago, and reported on work done at the institution. Char is made from coal by driving off part of the volatile contents in the form of gases and vapor. It is not a new product but relatively new processes now make it obtainable at reasonable cost. Processes were described.

A method of pulverizing coal, char and other solids, developed at the Institute of Gas Technology, was also described. It is known as flash pulverization. In it, powdered char, mixed with hot combustion gases, escapes from a compression chamber through a nozzle, and explodes with the removal of pressure into very fine particles.

Advantages of powdered char over raw coal include its higher rates of combustion with a considerably shorter flame, resulting in increased furnace capacity. Saving of four to five percent in fuel can be effected because of its lower hydrogen content and reduced surface moisture.

Science News Letter, June 28, 1947



WAC-B—American built, this rocket is a predecessor of the superior missile to be developed.

AERONAUTICS

Preventing Plane Crashes

Pilot errors of unavoidable misjudgment cause majority of crashes. Instruments can take out some of the guesswork.

➤ PILOT ERRORS, the cause of the majority of the major airplane crashes in the past year, might be responsible for fewer accidents if all commercial transports were equipped with more of the automatic controls recently developed to aid the human being at the controls

Pilot errors are not due to carelessness but to what might be called a type of misjudgment Trained pilots seldom knowingly take chances Headwinds and tailwinds can cause them to misjudge onward speed Hazy atmosphere may create optical illusions Radio static can prevent good radio reception

Even a radar scope requires a moment to interpret and another moment for the pilot to act This may be too long a delay in a fast-moving plane

Other Causes

Not all airplane crashes in the past year were due to pilot errors The U S Civil Aeronautics Administration states that they were the cause of the majority, however Other causes include structural defects, engine trouble and fires But even these might have been harmless if the planes were equipped with automatic devices which would have given the pilot early warning

Many instruments to make flying safer have been developed during the war and following years Most of them are still in an experimental stage Their use, however, need not await perfection Their installation is costly Their use might cut down pay load capacity and even require extra crew members But human life is at stake

If airplane companies cannot finance the installations the government perhaps should aid them

A great forward step has already been taken by the government in the installation of very high frequency (VHF) radio equipment at airports under the control of the Civil Aeronautics Administration This is static-free The CAA also is converting its radio ranges, the so-called radio beams on which commercial transports fly, to a very high frequency type It gives a reliable beam in all types of weather When a plane follows the beam, it is relatively safe from collisions with stationary objects such as mountains

Radar, hailed during the war as the cure-all for civilian flying in postwar days, has as yet not been widely installed in transports The war-type equipment was thought too heavy, too bulky and to require too many extra members of the crew to operate However, lightweight radar equipment has now been developed The Army announced a 125 pound set about nine months ago

Howard Hughes, of aircraft fame, has recently produced what he calls a radar-altimeter that flashes a light and sounds a horn when a plane comes within 2,000 feet of an obstacle

Automatic electronic pilots give great promise of increasing safety in planes They will hold a plane on the radio beam in cross country flights and on the glider beam in landing They respond to the waves in the beam A human pilot is still necessary, but his job is to watch the equipment and see that it is working properly

Automatic controls are said to handle engines, flight, navigation and even traffic control better than humans and without fatigue or error They are not subject to the "panel panic" that sometimes overwhelms the human pilot in a crisis This is due to the bewildering array of indicators and gages, switches and levers on the present panel board These autopilots make flight control easier, assist direction control, trim, altitude selection, constant speed and even bad weather landings

A few other instruments of improved types are needed A pilot needs to know wind direction and velocity He needs to know outside temperature At high altitudes, ice may form on propellers or wings Electricity in the atmosphere may interfere with electric equipment in the plane De icers and static dischargers are important

Then a plane should be equipped with automatic devices that warn a pilot of imperfect engine functioning and of internal vibrations that might result in structural failure

Science News Letter, June 28, 1947

INVENTION

Air Conditioning Cleaner

➤ AN AIR-CONDITIONER for railway passenger cars that incorporates an electrical air-cleaner is the invention on which F H R Pegg of Cranford, N J, has received patent 2,422,563 A series of electrically charged plates attracts and holds dust from outside air, and even tobacco-smoke particles from the car itself They are subsequently washed off and discarded Patent rights are assigned to Westinghouse Electric Corporation

Science News Letter, June 28, 1947

TURBINE TESTING—This equipment in the new gas turbine development laboratory, to be used for Army Air Forces engine research, can absorb and measure as much as 20,000 horsepower.

AAAS meeting prize 19
AAAS president 2
AAAS winners 53
Abacus, improved 234
Abel Stuart 341
A bomb, effects 219
A bomb products 261
A bomb speculation 35
A bomb survivors 382
Adams, Clifford R 86
Adams, Roger 332
Adams S L 268
Addleman Mary 163
Adhesion tester 176
Adhesives 16 112 192
Adsorption 267
Aiken Howard H 51
Air bulb 304
Air conditioning cleaner 406
Air eddies 212
Air-line all-weather 133
Air masses 374
Air separation 203
Air traffic rural 356
Aircraft noise reduced 222
Aird Robert B 296
Airplane refueling 357
Airport language 347
Alarm system 176
Albaugh F W 342
Albright Fuller 298
Alcohol 360
Alcohol from mold 268
Alcoholics paralysis of 185
Alcoholism cause 228
Alexander, Gordon 312
Alfalfa snout beetles 392
All-weather maneuvers 124
Allen Garrot J 244
Allen Henry B 182
Allington W V 396
Alloy for aircraft 251
Altschul A M 360
Aluminum alloys 41
Aluminum cleaning 25
Aluminum from clay 298
Aluminum in clay 179
Alvarez Luis W 121
Amazon Molly 201
American earliest 158
Americans perfect 398
Ammonium nitrate 258
Amon Senta 262
Amoroso Marie D 351
Amoroso Ruth 8
Amplifier cutting 345
Anderson F C 355
Anderson Hamilton H 402
Anderson Jane 57
Andrews Donald H 281
Andrews Edward D 69
Andrews F R 360
Andrews Henry N Jr 40
Animals 312
Animals one-cell 217
Antarctic warm area 180
Antenna wing 312
Anthony Katherine
Virginia 103
Anti-fogging agent 336
Antibiotic isolated 244
Antibiotic synthetic 263 264
Ants 35
Ape-men family 360
Appel W D 41
Apple cider 279
Apple tree late 41
Apples saving 25
Appleton Sir Edward 329
Arbor Day 221
Aries Robert S 15
Aring Charles D 201
Aspirin and bleeding 220
Aten, A H W Jr 345
Athlete's foot 183
Athletics 399
Athy L C 348
Atoll building 377
Atom mysteries 376
Atomic fission damages
brain 227
Atomic particles timing 61
Atomic power low-cost 66
Atoms suburban 297
Austin C R 91
Austin, J B 9
Austin T S 377
Auto engine 375
Auto, flying 357
Auto washer drier 96
Automobiles 41 64
Awning paint 352
Axelrod Dorothy 411
Ayres, John C 373
Ayers, Joseph W 356
Baby bottle warmer 64
Baby walker 224
Bacitracin 119
Back, A 223
Back Frank G 350
Bacon Osborne C 262
Bacteria 111, 270 307
Bacterial warfare 156 342
Bailey, Liberty Hyde 323
Bailey Medal 328
Baitsell George 2
Baking utensil 48
BAL for arthritis 183
Baldness, cause 228
Ball Eric G 279
Balloon, meteorological 186
Balsley J R Jr 89
Banshee fighter 343
Barail, Louis C 373
Barges launching 325
Bark 42
Barnes George E 409
Barnes T C 8 9 351
Barnyard disease 62
Baseboard trim 160
Basket baby 192
Bats 157 178
Battery cell 349
Battery one-pound 368
Bauer Hans F 245
Bassanella Max 41
BCG vaccine 232
Beal Grace A 168
Beans 197 360
Becvar Antonin 236
Beefsteak curing 265
Beesch S C 360
Begun S J 28
Bell Alexander 138
Bencze Stephen 200
Bennett Dwight G 281
Benning A F 264
Bent Arthur Cleveland 380
Berg William E 344
Berger A J 315
Berger, Irving L 325
Berliner Bernhard 329
Berry Willard 7
Bethe Hans 35
Betting 154
Beyer Karl H 71
Beyers F 376
Bieber Herman 163
Bigelow Mason H 265
Bikini animals 18
Billings Bruce H 23
Birds 44 62 88 190
Birdseye, Clarence 297
Birkinshaw John H 244
Bishop David W 318
Bittner John J 324
Black Maurice M 323
Blackett P M S 55
Blackouts 372
Bladan 40
Blalock Alfred 149
Blanks R F 285
Blau Abram 212
Blindness in babies 265
Bloch Felix 71
Block Melvin A 219
Blomberg Knut H 296
Blood bank animal 217
Blood cures from 130
Blood plasma 395
Bloodgood Don F 61
Bluejays 344
Board pry 96
Boat propeller 256
Bobb Audrie L 347
Bodies, fiber glass 240
Boeing L-15A 70
Bogert Marston T 104
Bohn, Ralph M 373
Bok Bart J 6 84 150
Bollen W B 238
Bomber flying wing 194
Bombers preserving 66
Bond Earl D 398
Bone-black synthetic 382
Bone graft 89
Bone infection 265
Bones, light 293
Boney W A Jr 247
Boots Ralph H 183
Bordley John E 22
Bossard, James H S 86
Bosworth, David M 120
Botany field work 167
Bottle carrier 208, 412
Bottle circulator 384
Bowen Harold G 12
Bowen I S 140
Bowman Isaiah 147
Boyers J S 28
Boyle Lytton 187
Bradbury Donald 322
Brady, Maurice K 121
Braille 24
Brain maps 199
Brain tissue extract 68
Brain waves 8 351
Braking electric 329
Braking on ice 28
Bramble Charles O 51
Brandner J D 355
Brasch Arno 119
Briggs Lyman J 232 340
Brill Madeline 57
Britt Stuart H 53 76 380
Broadcasting truck 336
Bronson Wilfrid S 94
Brookhaven Laboratory 277
Brookman B 281
Broom Robert 132 360
Brown Arthur L 153
Brown Ethan Allan 194
Brown Madelaine R 185
Brown Rowine Hayes 169
Brownell Katherine A 373
Brues Alice M 37
Brues Austin M 172 219
Brues Charles T 25
Brumbaugh A J 164
Brunetti Cledo 117 186 374
Buchholz John T 387
Bueding Ernest 329
Cardmaster 304
Cargo spoilage prevention 8
Caries agents in water 63
Caronamide 71
Carpentier M I 293
Carroll J A 114
Carving sets 80
Cashman R J 36
Caspari Ernest W 300
Cass O W 215
Cataracts congenital 217
Caterpillars 142
Caul H J 298
Cell electricity 279
Cells transplanted 317
Cisco C V 114 283
Chambers John L 39
Chaney Ralph 79
Chang Min-Chuch 317
Chapman H D 114
Char from coal 405
Charcoal from wood 15
Chaskin Harold 393
Chastel R 248
Chemical elements named 83
Chemists international
meeting 104
Cherries cracking 238
Chester W F 53
Chiggers chemical for 318
Child behavior 325
Childbirth relief 341

SCIENCE NEWS LETTER

Index—Vol 51

Nos. 1-26—January to June, 1947

Published by

Science Service, Washington, D C

Lift out and insert in binder at beginning of volume

Buettner O A 395
Bugie E 166
Bumpers stainless-clad 48
Bundy Francis P 216
Bunn Paul A 99
Burch, George E 390
Burgemeister Bessie B 344
Burlingame C Charles 285
Burners power-driven 128
Burris-Meyer Harold 310
Burroughs A L 390
Bush, Vannevar 23, 61,
164 294
Buswell G T 25
Butt Hugh R 56
Butter churn 208
Butterflies 222
Buxton Rex E 53
Byrd Richard F 60 89 130
Cahalane Victor C 200
Calcium carbonate 262
Calculator EDVAC II 184
Calendar pencil 368
Calorie need 168
Calvin Melvin 117 153
Camera detective's 326
Camera heavy-weight 284
Camera matchbox 195
Camera one-step 148
Camera speedy lab 327
Camp Charles L 132
Camras Marvin 28
Can-opener 192
Cancer 153, 216 274,
324 325 397
Cancer cells 84, 232 295
Cancer cure on way 133
Cancer from burn 323
Cancer-killing weapon 324
Cancer lung 388
Cancer shrinking 323
Cancer stomach 387
Cancer theory 6
Cancer virus 344
Cans, metal 336
Cape feather 168
Capp Charles H 345
Carbon 14 355
Carbon amorphous 356
Cardinell R L 310
Chin Y C 402
Chlorine preparation 116
Chlorine radioactive 261
Chlorophyll harnessing 2
Chor Herman 293
Choucroun Nine 56
Christensen Leo M 268
Chromosome photo 387
Chubb L W 131
Cirrhosis treatment 269
Clark Lewis J 298
Clarke Donald A 359
Clausen S W 393
Clauser Francis 105
Cleaning portal-to job 215
Clerf Louis H 388
Cleveland Mather 120
Click not music 296
Clinics for old folks 152
Clock signal broadcasts 22
Cloke Paul I 168
Clutch centrifugal 64
Coal flowing 284
Coal planer 176
Cobalt from ore 249
Cochran Albert L 79
Cocktails help heart 196
Code C F 372
Cody John F 68 250
Coffee for energy 341
Cohen Abraham 183
Cohen, Seymour S 263
Cohn Edwin J 180
Coke consumption 334
Colbert W H 232
Cold germs protected 104
Cold storage box 64
Cold wave damage 359
Cold waves 302
Colds 41 178
Cole Irwin H 104
College adjustment to 143
College scientist loss 164
Collins Vincent J 375
Colloids 386
Collyer Harry J 361
Colorblindness 319
Coltman John W 342
Coman Dale Rex 232
Comet Becvar 236
Comet Jakovin 405
Communication sys-
tem 288, 320
Compton, Arthur H 284
Compton Karl T 61
Computer 83 201
Conard Frederick U 264
Concrete corrosion 358
Condon E U 150 294
Condon Marjorie Z 360
Considine R J 356
Console music 336
Constellations summer 407
Conway Brandt B 38
Cooney James P 382
Cooper Leon 88
Cooperman J M 263
Cordes Frederick C 217
Corley Hoyt M 188
Corn cutter 224
Corn pollen 281
Cornman Ivor 324
Coronium line in sun 18
Corson D R 83
Coryell Charles D 83
Cosmetics synthetic 169
Cosmic rays source 275
Cotton maturing 130
Cotton mills scattering 126
Cottonseed oil purer 190
Cottrell F G 392
Cottrell H J 377
Coulthard C E 175
Covington James D 180
Cows highbred 249
Coyotes 94
Craig D N 349
Crawford A R 61
Crossland Frank J 251
Crowell George E 274
Culture western 150
Cummings Ralph W 89
Curare preparation 9
Current collector 89
Current for airplanes 328
Curie Irene 386
Curtis John T 105
Cutting and welding 382
Cyclotron magnet 118
D 558 transonic plane 103
2 4-D 200 280 284 311
Daly Byrne M 79
Dana B F 137
Danielson Irving S 141
Dannenberg, Eli M 341
Date tree pollen 232
Davidoff Eugene 338
Davies Rees 376
Davis Frederick B 284
Davis Helen M 298
Davis Watson 10 362
Dawson B H 114 283
Day, F 393
Day Edmund E 147 184
DDT 141 188 280 325 388
DeCapito Thelma M 403
Decay 180 389
Deer 200 238
Defense air attack 334
Degering E F 12
Dehydrating by thirst 355
DeLamater J N 178
Delinquency 116
Dellinger Joseph H 13
De Meillon Botha 25
Demerec M 163 295
Demerec Vera R 163 167
Deming G M 197
Dennis Clarence 75
Denton W I 108
Deome K B 63 104
Derby Harold K 135
Derbyshire George 298
Desmond Thomas C 86
de Terra Helmut 158
Deutsch Leopold 132
Developing package 256
Dewey Bradley 61
DeWitt C C 322
Dialing long-distance 244
Diatoms collect copper 408
Dickerson G E 328
Diet 1550 calories 169
Dietz, Robert S 77
Dill David B 372
Diphtheria antitoxin 141
Diphtheria remedy 178
Dippell Ruth V 19, 32
Dish-washer 16
Display compartment 32
Dobzhansky Th 374
Donald William G 47
Doodlebug at Antarctic 89
Dorouch, Gus 118
Drescher Todd M 404
'Doughnut' landing 373
Doughty J M 396

Dowling Harry F 169
Downs Malcolm B 89
Draeger, Rupert H 18
Drekter L 263
Drills for glass 400
Drugs relief 359
Dry Thomas J 56
Dryden H I 61
Dubbs Alfred W 183
DuBridge L A 294 356
Dunbar Paul B 126
Dunlap G W 376
Dunn Cecil E 386
Dunn Ruth C 25
du Pont Richard C 248
Dust collector 48, 192
Dvoichenko Markoff E 277
Dyer R E 41

Eagle Harry 259
Eagle radar antenna 104
Earth age of 179
Earth from 100 miles 213
Earthquakes man-made 40
Earthworms 236
Eat less to live longer 31
Ebert A A 264
Eclipse expedition 232
Eclipse observers 114
Eclipse of sun 282 309 340
Eclipse tells of stars 80
Eczema cause 264
Edgerton Harold A 53 76 380
Edison models 92
Edison Thomas A 90
Edlen Bengt 18
Egg before chicken 21
Egg white dried 378
Egloff Gustav 70
Egly R S 329
Eisenberg Jerome M 163
Ejector for pilots 24
Elasticity 409
Electric motors domestic 85
Electron beam visible 339
Electronic pencil 104
Electronic tube 16
Element 61 261
Element identification 71
Elephantiasis cure 320
Ellison W D 295
El Wafa Abou 232
Encephalitis germ 281
Engard Charles J 376
Engel Gilson Colby 387
Engine auxiliary 311
Engine baby 240
Engine big from 5 little ones 293
Engine combustion 332
Engine outboard 48
Engine trouble analyzer 40
Engstrom Ruby M 185
Ensor Charles 341
Enzyme frees phosphorus 139
Epic poem 203
Epidemics 276
Epilepsy 201 296 338
Epileptics psychiatry for 132
Ermoljeva Prof 181
Erosion soil 233
Essenberg J M 229
Evans Howard T 55
Evans Robert John 262
Evolution 48
Exhaust pipe coating 281
Exploration mechanizing 60
Eye examining 157
Eye-tester 32 368
Eye washing fountain 336
Eyster H C 2

Fabric fire resistant 232
Fabric flameproof 343
Fabric plastic 186
Fabric Terylene 41
Fabrics non-woven 178
Falco Elvira A 344
Farwell G 248
Fast John 75
Fatness inherited 328
Fats, news uses for 184
Faucet drip-proof 320
Fawcett H S 114
Feeding world 3
Feet keeping warm 77
Feldman William H 99
Fellowships public health 9
Felsenfeld Gary 163
Fermentation from straw 208
Fermi Enrico 182
Fernald Merritt C 264
Fertility cut 229
Fertilizer, nitrogen 121
Fiber impregnated 183
Figge, Frank H J 211, 229 275
Filachione M 313
Film chests library 144
Filter for infra-red 248
Finholt A F 23
Finken, W S 136
Fire blankets 32
Fire experimental 287
Fire extinguisher 192 360, 412
Fire-fighting clothes 320
Fires localizing 153
Fish byproducts 378
Fish disease 376
Fish landing net 400
Fisher Charles H 313
Fishing rod 144
Fishline sinker 412
Fissionable materials 194
Fitzgerald D A 358
Fixtures steel 288
Flares reflector 80
Flaw detection 110
Fleischmann Herbert 262
Fleischman Ralph 259
Fletcher Harvey 308
Flood control 79
Floor construction 57
Flory Sir Howard 392
Flow meter 32
Flow process 142
Flowers tree 218
Flu vaccine 371
Flu virus halting 327
Fluoride recovered 299
Fluorine container 302
Fluorine in rubber 152
Fluxmeter 197
Fly walks 160
Flying all weather 26
Flying private 189
Focus attachment 128
Fog dispersal Akron 182
Folsom R G 184
Fontaine T D 183
Food dehydration 297
Food invalid 316
Food likes 372
Food more sanitary 126
Food processing unit 256
Food shortage cause 136
Food sterilizer 119
Foot and-mouth disease 115 196
Forbush Scott E 275
Ford E F 48
Forrester Jay W 88
Forslind Erik 228
Fosdick Raymond B 244
Foster W C 393
Foster William F 375
Fountain of youth 371
Fowler Edmund P 47
Frame walking 128
Frank C W 310
Franklin Benjamin 277
Franklin Medal 182
Freeman J W 218
Freeman Walter 291
Friel W 179
Frieder I P 136
Friend Frances J 341
Frisch Robert 163
Fritz J C 262
Frogs red 121
Frozen blessings 14
Fruit ice 360
Fuel atomizer 291
Fuels synthetic liquid 198
Fuller Harrison 51
Fulmer Ellis I 200
Fults J L 313
Fungi 277 302
Funnel plastic 272
Furman D P 281
Furnace midget 96
Fusion of atoms 358

Galbreath W W 105
Galtsoff, Paul 409
Gangrene treatment 151
Garbage incinerator 80
Garden hoe 224
Garner, W R 296
Gas 32 120 144 208 377
Gas gangrene toxoids 141
Gas turbine engine 277
Gases war 411
Gasoline synthesis 318
Gates John I 331
Gats Arthur J 229
Gaviola, Enrique 114 283
GCA landing system 69
Gear track-type 393
Geiger Walter B 264
Geiman, Q M 19, 52
Generators steam turbine 59
George C W 163
Gerard Ralph W 147
Germ Texas namesake 408
Germs bred 392
Gibb T R P Jr 55
Gibson James D 299
Gibson John G 308
Gilliland E R 61
Gish O H 296
Glabe Elmer F 245
Glaciers 280
Gland chemical 390
Glass fiber use 361
Glasses 208
Glendenin L E 83
Globe distance 395
Gluing press 384
Glycerin production 200
Goat mouse 389
Goepp R M 355
Goiter 86 393
Goldberg Leo 18 18
Golden Fleece of Jason 120
Goldman Douglas 338
Goldman Edward A 46
Goldman Joel 183
Goldsteine H H 51
Goldwater Leonard J 249
Goodhart Philip S 371
Goodlow R J 178
Goodman J J 307
Goorley John T 119
Gordon Milton P 164
Gowen J W 328
Goudsmit S A 297
Graddick Charles P 376
Grains guns shot 63
Graff Samuel 344
Granger H R 359
Greece 180
Green H C 326
Green Robert G 84
Green R H 327
Greenblatt R B 377 388
Greene H S 315
Greenhouse plastic 386
Greenwald H A 95
Greenwald Isidor 86
Gregg Robert F 35
Grisein 85
Grogan Robert M 7
Grosse A V 261 302 355 382
Grossman Howard D 154
Grossman M I 278
Guhl Robert H 191
Guide photography 384
Guided missile research 20 61
Gum from pines 159
Gun rivet hand 16
Guppies disease control 8
Gustavson R G 147
Gutenberg B 118
Gwinn Joseph M 357
Gyorgy Paul 261

Haagensen C D 344
Habel, Karl 166
Haber Louis 39
Haddow Alexander 185
Hafnium isotope 345
Haglund R R 310
Hahn Paul F 397
Haldi John 341
Hallberg Olav F 307
Hamilton Joseph G 411
Hamilton Robert 318
Hammer O H 264
Hammock pack 48
Hammon W McD 281
Hamner C L 280
Handbag 240
Hangar 310
Hanger collapsible 352
Hansen W W 71, 88
Hanson Howard 308
Harlow W M 218
Harnden Charles W 270
Harrington David O 348
Harris Dale B 116
Harris, Daniel 139
Harris Stanley C 341
Harrison John B 39
Harrison Ross G 148 295
Hartman Frank A 378
Hassan Ali 292
Hassan M 232
Hastings Jane L 185
Hatch G B 318
Haurwitz B 14
Hauschka Theodore S 339
Hauser Ernst A 386, 409
Hausman Howard J 286
Hays R R 345
Headache tension 293
Headstrom Richard 44
Health world 38
Hearing chemical for 307
Heart 149 179 280, 390
Heating system 304
Heiss F H 313
Hekla 236
Helicopter 56 248 345
Hemminger Wilmer A 298
Hemoglobin 16 18
Hencken Hugh O Neill 8
Hendrix J P 359
Hendey N Ingram 408
Hening, J C 360
Henshaw Paul S 219
Henneman Richard H 286
Henry A W 307
Hepting George H 159
Herbut Peter A 388
Herget Paul 136
Heritage Clark C 42
Hermans P H 60
Herrick J F 404
Hersey Anne 103
Hess H H 41
HET insecticide 88
Heterick Robert H 39
Hibben Frank C 312
Hibben Samuel G 149
Hickey Richard J 200
Higashi Aeme 329
Highway paving 285
Hildebrand J H 294 297
Hill Ralph H 332
Hill Thomas J 389
Hilleboe Herman F 68
Hiller Siegfried 391
Hillier James 214
Hilsch R 263
Hinshaw H Corwin 99
Hirschler Alfred F 262
Hirsh Harold L 169
Hitchings George A 344
Hoagland Charles L 269
Hoak Richard D 261
Hoare Cecil A 339
Hobbs William H 280
Hoffman James I 179 298
Hoffman John Drake 298
Hog fattening 313
Hog houses 112
Holmes Arthur 179
Holt Philetus H 260
Hoover Herbert 109
Hormone fat 373
Horn Daniel 372
Horses evolution 78
Hoskins William M 188
Houchin O Boyd 229
Houlton H G 142
Housefly 394
Houses 252 314
Hoyne Archibald L 169
Hsueh Y L 200
Hu H H 79
Hubbard Willard 298
Hubbs Carl I 201
Huber Wolfgang 119
Hughes Howard 406
Hughes W P Jr 130
Hull Albert W 294
Hunger from munitions 358
Hurley Samuel C Jr 104
Huseby Robert A 324
Hussey G F Jr 61
Hydraulic pumps 176
Hydrophotometer 384
Hyenas in zoo 159
Hypnotism 245

Ice chest 320
Ice cubes production 121
Ice-free windows 168
INDA traced 279
Incisions crosswise 75
Infantile paralysis 57, 312 375
Infection drug 402
Ink for apparatus 336
Insect deflector 48
Insecticidal compound 118
Insects 217 382
Instrument panels 169
Insulation 267
Iodine radioactive 95
I Q of mental patients 24
Iron oxide 323
Iron-smelting process 222
Ironers household 144
Irving G W Jr 183, 279
Irwin C F 264
Isaacs Raphael 341
Isenberg Sampson 135
Isotopes 187 386
Ivy, A C 278
Ivy poisoning 377

Jackman Kenneth R 361
Jacobson, L O 244
Jacobson Winifred 19
Jansey Felix 18
Jar cap remover 208
Jelmeter 412
Jenkins F A 140
Jenney John A 21
Jet engines 199 218 260, 280 322 362
Jewett nail 120
Johannsen Homer V 395
John J Carty Award 295
Johnson Balbina 119
Johnson E M 339
Johnson Robert F 252
Johnston Thomas M 19
Jones Donald F 281
Jones Harold E 399
Jones Ogden S 61
Juncos 161

Kabat Elvin A 395
Kade Charles F Jr 316
Kadish Arnold 2
Kagy John F 130
Kamb Walter H 85
Kamen M D
Kane E D 134
Kane L J 405
Kark Robert M 252
Karplus Martin 88 163 16
Kasha Michael 117
Katsampes C P 393
Katz R A 151
Kerr Paul F 54
Keston Albert S 95
Ketchup dispenser 288
Kettering C F 3 375
Kidney artificial 296
Kilgore Senator 23
Kimball Jim 156
King Lester S 297
King Pei Sung 396
King William F 152
Kinney S P 314
Kirkpatrick Willis B 121
Kirschbaum Arthur 186
Kirshenbaum A D 355
Klein Henry 63 250
Kleiner Israel S 323
Kline G M 37
Klopsteg Paul F 184
Klyueva Nina 339
Kniesner Albert H 389
Knife sharpener 36
Knoll H A 15
Koechlin Bernard 130
Koffolt J H 326
Kolff W J 29
Koomen M J 15
Kopac M J 5
KR for cancer 34
Kramer Samuel N 20
Kramke F H 262
Kraus Joseph H 92
Krieble R H 108
Krusen Frank H 404
Kunkel Henry G 269
Kupperman H S 377 388

Lab duster 134
Labby Daniel H 269
Laboratory flying 23
Lacey H T 313
Lactic acid 313
Laidler Keith J 269
Lake Wilbur E 317
Lambert E H 372
Lambert W V 240
Lambou Madeline G 360
Lamp airplane reading 224
Lamp arc 176
Lamp electric 288
Lamp photochemical 359
Lampblack saves fish 182
Land Edwin H 148 284
Lands A M 359
Langer B F 89
Langmuir Irving 127
Lapp Ralph E 68
Larsen A F 345
Latin America 249
Laundering 26
Laundries supersonic 329
Lawrence Ernest O 67
Lawrence Nancy 57
Lead sheathing 27

Le Beau D S 400
Leden Ursula 404
Left-handedness 312
Legg D A 360
Leighton M M 7
LeMay Curtis E 12
Lemmon Walter S 21
Lemon juice and teeth 217
Lens 350
Lenses glassworkers' 215
Leopold Aldo 288
Leslie Robert T 298
Leukemia 185 341
Level spirit 352
Levinson S O 166
Lewis G N 117
Lewis R C 310
Li C H 390
Libby W F 355
Liberson, W T 338
Lichens 366
Liebmann A J 327
Life longer 348
Lifeboat flying 328
Light bulb electric 64
Light stand 208
Lighting 195 197 392
Lighting for planes 402
Lighting system portable 56
Lignin use 118
Lilienthal David E 391
Limbs artificial 184
Limb lopper 128
Lind Samuel C 358
Lindberg John 40
Lindblad Bertil 282
Lindquist J R 346
Link F R 284
Link K P 220
Lockie L Maxwell 183
Lockwood Charles A 246
Lockwood Maurice H 89
Locomotive switching 128
Lombard Olive M 178
Long Perrin 274
Loomis R C 54
Loring Hubert S 57
Lost colony 328
Lou C H 200
Loud-speaker system 56
Lovestedt Stanley A 217
Lowell Francis C 195
Lowey Herbert 298
Lucas E H 280
Lundberg Hans 158
Lynch Eva Maria 68
Lyons U S 309
Lysell R A G 296

Machines calculating 51
Mackenzie K R 83
MacLean Bernice I 214
MacLean Kenneth F 75
Magnesium source 61
Magnetism earth 150
Magneto encased 40
Magnuson Harold J 259
Maleic acid 393
Man-ape hunt for 132
Mann William M 121
Marihuana-like drugs 332
Marinsky J A 83
Markings dial 400
Marr John W 167
Marriage 62 86
Marsh H A 310
Marshak Alfred 68
Marshall Fitz-Hugh 342
Marshall I C 67
Martinez Maximino 216
Martyr desire 329
Marzoni F A 359
Mask, calorie-saving 181
Mason H L 46 390
Mather Kirtley F 2
Mattress fiber glass 80
Mattuck Arthur P 88
May flowers 270
Mayan art 391
Mayan culture 8
McCay C M 31 168
McClendon J F 393
McCloy John J 35
McClure H F 281
McConnell J D 126
McCoord A B 398
McCorkle H J 265
McCoy J E 217
McCoy Lowell R 25
McDermott Walsh 99
McGinnis James 262
McHaffie, I R 104
McKahnn Charles F 410
McKee, Ralph W 19 52
McKennon F L 345
McLaughlin Dean B 40
McLean David A 360
McLeish William Lee 163
McMath R R 18
McMurtrie R L 349
McNeill, H L 405
McWhorter F P 137
Means J H 66
Medical practice era 50
Meeker Oden 389
Meiklejohn Arnold P 195
Meitner Lise 163
Melchoir Jacklyn 231
Meleny Frank L 119
Memorial Day 384
Mendeleva N A 181
Menninger William C 292
Mensel Donald H 13
Mertens Willi 267
Metals scarce 105
Meteor 77 87 188
Meter for wood 288
Methlyamines 329
Metronome electronic 64
Mexican border fence 158
Meyer Charles A 322
Meyer Karl F 101
Meyer M F 310
Michael Stephen E 244
Michaelis Robert 175
Michener Charles D 348
Michener Mary H 338
Michie C B 114
Microscope 361
Microscope attachment 185
Microprojector 160
Microwave beacon 281
Milky Way 84 150
Miller A S 310
Miller Love Holmes 184
Millson H F 313
Mind adaptability 374
Mine explosions 267
Mineral detection 54
Mines safer 277
Minnow bucket 352
Missile guided 20 61
Mist blower 384
Mitchell J W 279
Mixer electric 304
Mixer Harry W 185
Modell Walter 359
Moe Henry Allen 147
Mohler O C 18
Mohr Charles F 178
Molecular still 182
Monahan A C 26 106 138 284 314 330
Monroe Benjamin C 181
Montagu M F A 374
Montgomery R B 221
Mooney Melvin 219
Moore Dan H 344
Moore M E 263
Moran Allen B 408
Morgan Clifford T 348
Morgan Howard K 347
Morgan Hugh J 297
Morgan M G 118
Morrow Martha C 42 170 282
Morton Julius Sterling 221
Mosquito 24 39
Moths mice bred 300
Motion picture equipment 48
Motion picture methods 28
Motor boat toy 272
Motor modern 128
Mount Etna eruption 147
Mountain lion 312
Mousetrap electric 345
Mudd Stuart 181
Mull Raymond A 340
Muller H J 20
Multiple sclerosis 395
Muscle disease 343
Mushrooms 398
Music 310
Murdoch Joseph 119
Muschenheim Carl 99
Mutation of mice 20
Myeloma 60
Myers Jack 20

Nagy Irene E 163
Nail wire 132
Nakata Avaro H 376
National Academy elects 294
Natoli Rosetta V 103
Navigation aid 313
Neel James V 219
Negative hanger 160
Nehru Pandit J 55
Nelson Carleton 75
Nelson W D 118
Nerves as batteries 9
Nervousness harm of 348
Neurotic patients 292
Newton E 274
Nieburgs H E 377
Nielson Erik R 393
Nile power from 265
Nininger H H 270
Nitrogen fixation 392
Norcross B M 183
Norlund N E 221
Notatin antibiotic 175
Nova Persei eruptions 40
Novae cause of 149
Novick Rosalind 277
Nowosielski F B 40
Noyes Albert W Jr 147 294
Nuevite naming of 119
Nursing 74
Nursing bottle cure 131
Nut self-locking 368
Nutini Leo G 68
Nylons from corn cobs 215

O Brien Brian 76
O Brien Donald F 166
Ocean 41 140
O Connor Basil 395
O Dwyer William 260
Oil 7 24 103 167 322 371
Oleomargarine 261
Oliver-Gonzales Jose 8
Olson B J 166
Olson Harry F 393
Oppenheimer F 166
Oppenheimer J Robert 100
Optical glass cleaning 185
Orange juice keeping 75
Orchids doped 105
Ore separation 405
Organic compounds 188
Ormsbee Richard A 324
Osborn Frederick 150
Ott Harvey N 361
Oven electric 112
Overman Ralph T 261
Owls smallest 184
Oxygen 152 279

PABA 56
Pacaiana 55
Packaging 373
Packard Martin 71
Packing material 180
Page Ernest W 201
Paidusakova Ludmila 236
Paikover 412
Pain relieving 291
Paint brush 320
Paint heatproof 272
Paneth F A 83
Paper all-weather 57
Paper-mill waste 410
Parasite Devonian 40
Parker C D 258
Parsons William S 121
Passano Foundation Award 300
Paterson Edith 185
Pauling Linus 152
Pavlish A F 91
Payne M G 313
Pearlmutter Morris 359
Peeler two-bladed 256
Pegg F H R 406
Peklo Jaroslav 111
Penicillin 88 121
Penney Gaylord W 263
Pentothal hypnotic 135
Penty W P 357
Percy M 83
Perfume dispenser 240
Perkins R Marlin 137
Perlstein D 327
Perrier C 83
Perrine I E 123
Persson Bengt O E 223
Pest control 25
Petals 318
Peters Lawrence 329
Pevere E F 318
Pheasant census 356
Phenol production 108
Phonograph needle 208
Phosphorus in soil 89
Photocells use of 86
Photoelectric inspector 104
Photo-flash units 38
Photograph frame 384
Photographic analyzer 208
Photography aerial 278
Photosynthesis 20 117
Piano keys plastic 41
Picard Robert G 185
Pickford R W 319
Pierce R T Jr 349
Piggott Willard R 166
Pill intelligence 344
Pincus Gregory 317
Pine trees 46 216
Pipe cleaner 96
Pipe plastic-coated 80
Pipeline laying 316
Pirarucu 49
Piasecki Edward A 312
Plane accidents 286 372
Plane crashes cause 406
Plane detection 216
Plane safety 248
Plane sickness cause 376
Planes 43 50 54 70 78 101 214 276 293 376 395
Planets minor 136
Plant cells changing 88
Plastics 2 37 187 224 333 356
Play rack 304
Plutonium 172 249
Pneumonia 344
Podophyllin 297
Poliomyelitis 57 312 375
Pollen detection 195
Popenoe Paul 86
Poppen John R 402
Porcelain glass free 78
Ports ice free 223
Potato blight resistant 409
Pothole erosion 85
Potter C I 85
Potter Ralph K 158
Poultry diseases 247 390
Powder 240 268 293
Powell Alfred R 377
Power W H 349
Powers Paul O 137
Powers W I 238
Prairie plowing 254
Pratt John J Jr 39
Pray Leon I 39
Pre dinosaur time 46
Pregnancy test 201 388
Prendergast D T 130
Preserving meat 245
Pridham A M S 284
Priest H F 302 382
Printed wire 374
Problems solving 349
Protein synthesis 281 403
Pryor M G M 217
Puma 46
Putnam Tracy J 344
Pyrethrin synthesis of 188
Quick decline 114
Quinoline 342

Rabies paralytic 178
Rabin Albert 24
Race American 37
Racon routes 197
Radar 123 231
Radar in medicine 404
Radar like system 131
Radford A W 61
Radiation detection 342 378
Radiation sickness 244
Radio antennas 95
Radio built in 240
Radio clock 400
Radio long-distance 118
Radio portable 352
Radio station tiniest 117 186
Radio system dual 21
Radio tones 383
Radium aids hearing 22
Ragan Charles 183
Ralston Anderson W 184
Ramie 170
Ram jet 260 280
Randall Henry T 344
Rapp Gustav W 220
Rappleye Willard C 50
Raschke W L 345
Rat trap 317
Ratchford H I 345
Rations army 252
Raven wise 380
Ravenel Samuel F 233
Ray Clarence Thorpe 390
Rayon 326 392
Reading silent 25
Rear view mirror 233
Reardon M J 359
Record cleaner 304
Recording attachment 191
Records magnetized wire 88
Reddick D K 409
Reducing agent 23
Redwood trees in China 79
Reed C A 262
Reeves W C 281
Refrigerator 167 264
Reichelderfer, F W 326
Reid A F 95, 355
Reid J C 153
Reilly Edith F 6
Reinhardt Thomas E 313
Reinitz B B 271
Remson Ira 358
Reparations Germany 115
Research 230 386
Reservation machine 48
Resnatron 67
Ritter William F 229
River de-smelling 262
Riveroll Elfego 222
Rivers Thomas 312
Roberts Walter O 13
Robertson Carl 137
Robinson Sir Robert 182
Rock tests 285
Rocket dummy 169
Rocket engine cooling 213
Rocket propulsion 121
Rocket study techniques 216
Rocket U S 405
Rocky Mt spotted fever 233
Rodert Lewis A 41
Rogers Philip V 229
Rogers Walter E 218
Rogers William M 229
Rohner I V 121
Romer Alfred S 21
Rooker W A 279
Rose Annelies A 143
Rosenbaum Milton 135
Roskin Gregory 339
Ross Ron 90 186 378
Rotbart David 238
Rotman-Kavka Georgine 169
Rotors novel-type 181
Rowe Albert H 264
Rubber facing 256
Rubber from petroleum 269
Rubber goldenrod 345
Rubber production 46 57
Rubber synthetic 138
Rubin Saul H 268
Rudolph B A 121
Runway lights 311
Russell Henry Norris 30
Russell P B 217
Russell Robert P 364
Russia 102 277
Rynes Samuel E 377

Sackett Clifford 40
Safe wall 80
Salamanders 318
Salisbury I Frank 152
Salisbury W W 67
Salt pepper shaker 32
Samuels Leo 325
Sandpaper 144
Sandwich shops 368
Sanford Heyworth N 166
San Tsiang Tsien 248
Sargent Frederick 178
Sargent M C 377
Sargent Virginia W 178
Sawyer Wilbur A 88
Sayers R R 198
Sayler H B 61
Scarlet fever treatment 169
Schaefer Vincent J 6 89 127
Schatz A 166
Scheifley Charles H 56
Scheiner J 268
Schell Irving I 402
Scherer Robert P 229
Schiller Irving W 195
Schlesinger H I 23
Schrodt J P 349
Schubert Jack 249
Schumaker F W 260
Schwarcam Alexander 134
Schweller E F 167
Schwerdt C E 57
Schwerdt Patricia Ruth 57
Science 38 150 153 164 181
Science Foundation 23 147 184 220
Science Music Institute 308
Science prediction 1947 4
Science previews 1947 10
Science Talent Institute 149
Science Talent Search 87
Science talent test 73
Science talent winners 53 54
Scientific advances 297
Scientific cooperation 288
Scientific talent 137
Scientists top young 380
Screwdriver nylon-shafted 400
Scrub water pick up 18
Sea level lowering 8
Seashore Robert H 340

Do You Know?

Snowflakes, caught in the air in a quickly drying plastic solution, are preserved for scientists studying snow crystal forms

American *steel* industry depends largely on iron ore from the Mesabi region in Minnesota, this high grade ore, used to produce about 85% of the steel made, is shipped by water from western Lake Superior to Lake Erie ports

Calcium cyanamide, which is made in one process of fixing atmospheric nitrogen to manufacture fertilizer and explosives, was produced in Germany at low cost by a continuous rotary furnace process

When tomatoes are raised to make *catsup,* high acid content is desirable to give sprightly flavor, potash applied as a fertilizer to the growing crop will increase the acid in the tomatoes produced

Wartime developments in the use of *aluminum* have boosted it into a position of the second rating metal of peacetime industry in terms of volume produced, iron, including steel, is number one

Among American common *vegetables,* cabbage, carrots, beets, peas, cucumbers and cantaloupes are of Old World origin, potatoes, tomatoes, green peppers, pumpkins, and most squashes and beans were originally New World products

YOUR

HAIR

AND ITS CARE

By O. L. Levin, M. D. and H. T Behrman, M D

Two medical specialists tell you what to do to save and beautify your hair stimulate healthier hair growth, and deal with many problems, as

Dandruff — gray hair — thinning hair — care of the scalp—baldness—abnormal types of hair—excessive oiliness—brittle dryness—hair falling out—infection —parasites—hair hygiene etc., etc

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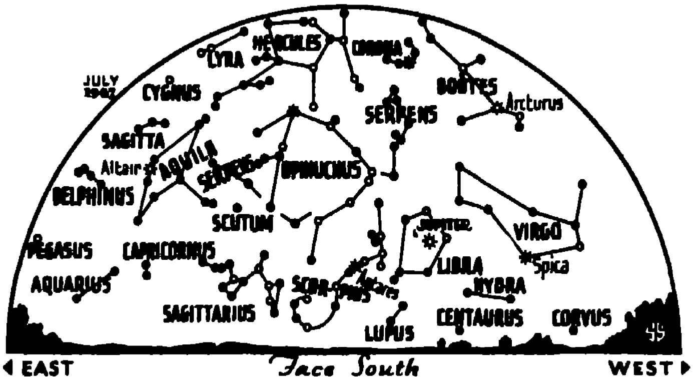


☼ ✱ ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

cules, just west of Lyra Hercules, you will recall, performed twelve classic labors, of which the fifth was to kill the birds of Lake Stymphalis Aquila is sometimes considered to represent one of these birds, and Sagitta is the arrow he used, still shown in flight towards its prey However, it has also been made the arrow of Cupid!

On the opposite side of Aquila, just above Sagittarius, one star is shown marking the shield, Scutum This is a relatively modern constellation, having first been shown on the star maps published in 1690 by the Polish brewer and amateur astronomer, Johannes Hevelius He called it "Sobieski's Shield," to honor the third John Sobieski, king of Poland A distinguished soldier, he commanded the troops who freed Vienna from the Turks in 1683, so it is not surprising that the loyal Hevelius seven years later honored him with a constellation to fill a part of the sky which up to then had been empty

Another of Hevelius' constellations is that of Canes Venatici, the hunting dogs, in the curve formed by the handle of the Great Dipper Also to him we must give credit for Lacerta, the lizard, now seen in the northeast, and represented on the maps by a single star, Leo Minor, in the northwest, and several others not shown

• • •

Celestial Time Table For July

July	EST	
3	5 38 a m	Full moon
	10 00 p m	Moon farthest 252 500 miles
5	5 00 a m	Earth farthest from sun 94 451 000 miles
11	5 54 a m	Moon in last quarter
14	1 00 p m	Mercury passes sun
	11 58 p m	Moon passes Mars
17	12 40 a m	Moon passes Venus
	6 00 p m	Moon nearest, 222 000 miles
	11 15 p m	New moon
18	9 50 p m	Moon passes Saturn
22	4 00 a m	Mercury passes Venus
24	5 54 p m	Moon in first quarter
26	1 41 a m	Moon passes close to Jupiter
28	early a m	Meteors of delta Aquarid shower visible
31	1 00 a m	Moon farthest again 252 400 miles

Subtract one hour for CST two hours for MST and three for PST

Add one hour for the corresponding Daylight Saving Time

Science News Letter June 28 1947

BIOLOGY

Diatoms Collect Copper

➤ COPPER is collected by one-celled sea plants known as diatoms in concentrations that are scores of times strong enough to kill them—in theory at least

Analysis of these microscopic vegetable junkmen made by an English scientist, N Ingram Hendey of the Admiralty Central Metallurgical Laboratory, shows that several different species contain anywhere from 31 to 164 parts per million of copper by weight By way of contrast, Mr Hendey mentions that one-half part of copper per million is considered to kill the plants' freshwater relatives that sometimes make trouble in city water systems The sea water in which the specimens were collected for analysis contained only seven parts per billion of copper

What these micro-plants do with their copper collections has not yet been determined Mr Hendey suggests that it may either be chemically shelved as a precipitate or coagulate, or that it may have some functional role in the plant-cells' pigment bodies

In his communication to *Nature,* (May 10), Mr Hendey does not mention a possible connection between this copper-collecting activity of diatoms and the high copper concentration in oysters, which feed largely on diatoms It has been known for some years, for example, that oysters in the infant phase of their lives will not settle down and start growing shells unless there is a trace of copper in the water over their beds

Dr Paul Galtsoff, of the U S Fish and Wildlife Service's fisheries laboratory, expressed lively interest in a possible connection between copper in diatoms and copper in oysters Oysters, he said, have a tolerance for copper far beyond their known physiological requirement for the metal Some of the laboratory tanks with which he works have copper or brass fittings, and the oysters in them absorb so much copper directly from the water that they turn green He added that oysters often have far greater quantities of zinc than of copper in their bodies, but nobody has yet found out what they do with it

Science News Letter June 28 1947

PLANT PATHOLOGY

Blight-Resistant Potato Is New Variety Produced

➤ BLIGHT RESISTANT potatoes, able to defy the fungus disease that ruins millions of bushels yearly and that a century ago caused famine in Ireland, seem at last to be realized Dr D R Reddick, Cornell University plant pathologist, has produced several new varieties by crossing cultivated potatoes with a wild species from South America

In 1927, after ten years of vain search for an immune variety, Dr Reddick broadcast an appeal through the press A farmer in northern New York, Fred Ashworth, responded with this South American species, which he had imported in an effort to get a frost proof potato and had found to be blight proof instead

Dr Reddick found the South American potato worthless as a crop plant, but was able to hybridize it with good cultivated varieties in such a way as to produce a number of varieties that are expected to prove profitable as well as immune to the blight

One of the new varieties hė has named Ashworth, in honor of the man who gave him the South American parent strain Others are called Chenango, Empire, Essex, Fillmore, Hartford, Madison and Snowdrift Test lots of the new varieties are now being tried out at a number of experiment stations, including one in Costa Rica

Science News Letter, June 28, 1947

CHEMISTRY

Rubber Fibrils Squeeze Out Drops When Stretched

➤ RUBBER DEPENDS for its elasticity on its ability to squeeze liquid droplets out of its micro-fibrillar structure when stretched Other elastic substances have the same micro structure, with minute fibers enmeshing a liquid

This was one of the findings laid before members of the American Chemical Society in Palo Alto, Calif, by Prof E A Hauser of the Massachusetts Institute of Technology and Dr D S le Beau of the Midwest Rubber Reclaiming Company In their research they used an ultramicroscope, which is a quartz lensed instrument using short wave ultraviolet instead of visible light It does not give as high magnification as the electron microscope but on the other hand spares the specimen the destructive bombardment of the electron stream

The same soap or other detergent that takes grease and dirt out of fabrics can help get otherwise insoluble dyes into them, Prof James W McBain of Stanford University reported to the American Chemical Society Less than one per cent of a "solubilizing" detergent will help the dye to take hold A similar phenomenon has been observed in nature, he pointed out, in the transportation of the insoluble vitamins A and K in the body fluids

Associated with Prof McBain in this study were A G Wilder and R C Merrill, Jr

Science News Letter June 28 1947

ENGINEERING

Stream Pollution Costly Even If Waste Is Used

➤ INDUSTRIAL wastes or sewage which pollute a stream are costly, even when useful by products such as fertilizer are recovered, Prof George F Barnes of the Case School of Applied Science told the American Society of Mechanical Engineers meeting

More and more, industry can expect to have to bear some of the costs of this national problem, Prof Barnes warned

Polluting streams with wastes from industry runs up a bill of millions of dollars each year, he explained The old idea, made famous by the French author, Victor Hugo, in his classic "Les Miserables," that recovering wastes such as sewage by chemical treatment can produce by-products to foot the bill is not true, Prof Barnes declared

The income from by products of sewage and other industrial wastes will reduce the costs of stream pollution, but it will not pay the whole cost

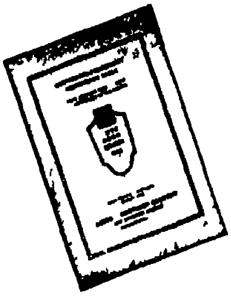
Stream pollution, the speaker explained, creates "indigestion or disease" of a river The cure is expensive Sewage must be treated Sewage borne solids must be removed or treated When sludge, scum, grit or screenings are removed from the polluted stream, there is still the problem of disposing of this waste

While there are standard treatments for sewage pollution of streams, Prof Barnes said that industrial wastes sometimes create unusual problems Such wastes from industry as oil, acids, cyanides or metals require special treatments

In one state, Pennsylvania, alone, the estimated needs in industrial waste treatment plants have been estimated at $35,000,000

The trend is toward industries directly bearing at least part of the cost of stream pollution, Prof Barnes stated

Science News Letter June 28 1947



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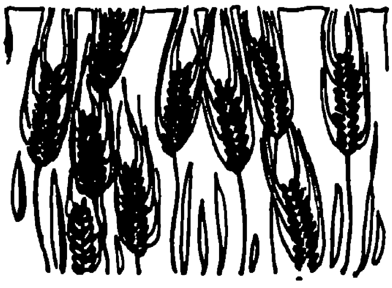
AGRICULTURE

NATURE RAMBLINGS

by Frank Thone



Record of Achievement

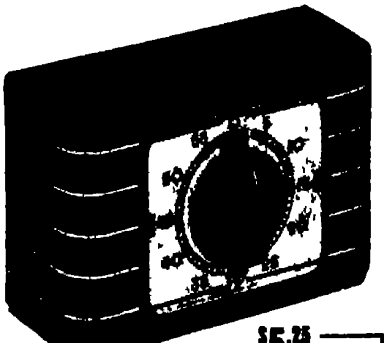
➤ HOPES FOR BETTER eating are held out to a famine-menaced world in the new Yearbook of the U S Department of Agriculture Higher-yielding plants and faster growing, fatter animals, more efficient cultivation that saves the soil while it uses it, deadlier weapons against crop-destroying insect pests, grains with disease resistance bred into them—all these, and much besides, crowd the 944 pages

This is the first Yearbook the Department of Agriculture has issued since the beginning of World War II Even the "skimmiest" kind of examination produces a most astonishing catalog of new things under the farmer's sun Just at random DDT, benzene hexachloride, 2,4-D, hybrid vigor in cattle, poultry and other animals, application of the hybrid idea to a range of plants from alfalfa to onions, feeding hormones and vitamins to animals, insect repellents, penicillin and other antibiotics in veterinary medicine—the list might be continued almost indefinitely

Sometimes two scientific techniques are combined in one job For example, a promising wheat hybrid proved sterile because its chromosome number was wrong So the geneticists used colchicine to get offspring with double the chromosome number, and these proved perfectly fertile

Department of Agriculture researchers know well that man does not live by bread alone Along with their new strains of corn and wheat they have been breeding bigger and better berries and fruits and even doubling the size of Easter lilies

Science News Letter, June 28, 1947



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NUTRITION

Disease Can Starve Babies As Well as Lack of Food

➤ PICTURES of starving babies, pathetic little bundles of skin and bones with big, tragic eyes, stopped many a doctor strolling through the exhibits at the recent American Medical Association meeting Some of the babies pictured were European war and famine victims Others were American babies brought to hospitals in the Boston and Cleveland areas for treatment for malnutrition Without the labels under the pictures, you could not have told which was from Europe and which from the United States

The American babies were not starving from lack of food Their parents could and did provide plenty of the right kind of infant fare, with vitamins, proteins, carbohydrates and minerals, that ordinarily causes youngsters to thrive and grow

These babies were sick babies They were starving because disease, usually a chronic infection, kept them from being nourished by their food Their pictures were shown by Dr Charles F McKhann and Dr Samuel Spector, Western Reserve University School of Medicine, to call the attention of other doctors to the fact that malnutrition is not always the result of poor or scanty diet

Only one out of 10 of the more than 1,000 malnourished infants they studied were starving because of lack of the right kind of food About one in 10 failed to gain weight because of some psychological or emotional disturbance or refusal to eat

The other eight out of each 10 were malnourished because of disease, often a disease not easily detected

Dr McKhann said the principal diseases causing loss of weight and other results of malnutrition are infections of the nose, throat, lungs and other parts of the respiratory tract, with infected adenoids, and sinuses probably causing the greatest amount of trouble Other causes are congenital heart disease, disturbances of the metabolism, infections of the kidneys and genito-urinary infections, and coeliac syndrome

Science News Letter, June 28, 1947

ORNITHOLOGY

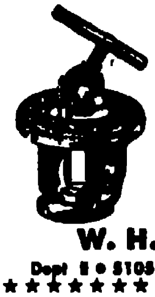
Starlings Prefer Waltzes To Sousa's Martial Music

➤ LATEST WEAPON against those pesky birds, the starlings, is march music, but it probably will not help rid your town of starlings

At the Philadelphia zoo, starlings built their nest in a loud speaker They were not disturbed at all by the soft strains of waltzes But when the stirring marches of John Philip Sousa were played, the starlings stirred They flew off when the martial music began and returned only when it finished

It seems the zoo's taste in music agreed with the starlings, though They have raised four babies and are incubating a second brood

Science News Letter, June 28, 1947



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Books of the Week

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ALASKA BECKONS—Marius Barbeau—*Caxton*, 343 p, illus, $4 50 A dramatic interpretation of the Indian lore of this north country and correlation of these peoples history, folk lore and music with the Asiatic peoples of long ago

AMERICAN MILITARY GOVERNMENT IN GERMANY — Harold Zink — *MacMillan*, 272 p, $4 A careful analysis of the development of military government from temporary measures to long range planning, the obstacles encountered and future plans

BLOODHOUNDS AND HOW TO TRAIN THEM —Leon F Whitney—*Orange Judd*, 142 p, illus, $2 A complete discussion of the training required to teach these hounds to trail man Police procedure is particularly emphasized

CHEMISTRY OF MUSCULAR CONTRACTION —A Szent Gyorgyi—*Academic Press*, 150 p, illus, $4 50 Delivered as the Cameron Prize Lecture at the University of Edinburgh, this is a discussion of the constituents of the contractile muscle fibril and the induction of contraction *in vitro*

THE DATES AND EDITIONS OF CURTIS' BRITISH ENTOMOLOGY—Richard E Blackwelder—*Smithsonian*, Misc Col Vol 107, No 5, 26 p, illus, paper, 25 cents A comparison of the original edition of this classic source for genotype designation with the revised reprint edition In the latter some major changes were made in genotype designation and nomenclature

FABRIC STRUCTURE—John H Strong—*Chemical Pub*, 241 p, illus, $6 Completely illustrated with diagrams and photographs, this text is both a good foundation for textile students and a useful reference book Particular emphasis is laid on the characteristics of the different threads, both natural and artifical

HERMON CAREY BUMPUS YANKEE NATURALIST—Hermon C Carey, Jr—*Univ of Minn*, 141 p, illus, $2 50 This biography records the varied career of a man distinguished as biologist, museum director, and college official

A HISTORY OF THE AMERICAN MEDICAL ASSOCIATION 1847 to 1947—Morris Fishbein—*Saunders*, 1226 p, illus $10 Commemorating the centennial of the A M A, this history reviews its rise as a great organization, its campaigns in behalf of medical education, to eliminate quackery, improve industrial health and provide throughout the country a high quality of medical care

MICROBIAL ANTAGONISMS AND ANTIBIOTIC SUBSTANCES—Selman A Waksman—*Commonwealth Fund*, rev ed, 415 p, illus, $4 Bringing up to date the material on streptomycin a[illegible]enicillin, this basic text in antibiot[illegible]also an enlarged bibliography

P Q R S T—Joseph [illegible] Riseman—*Macmillan*, 84 p, illus, $3 50 A beginner's *guide for use during examination* and interpretation of electrocardiographic tracings

QUALITATIVE ANALYSIS BY SPOT TESTS, Inorganic and Organic Applications—Fritz Feigl—*Elsevier*, 3rd ed 573 p, illus, $8 Completely up to date, this classic text on spot analyses is again available A section on technique and apparatus is included as well as a survey of all literature on spot test analysis

RADAR ENGINEERING—Donald G Fink—*McGraw Hill*, 644 p, illus $7 Designed to provide a general compilation of radar information, Part I deals with fundamental concepts of radar technology, Part II with components, circuits and structures used in equipment

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MEDICINE

"Tagged" War Gases Traced Through Body

➤ "HUMAN GUINEA PIG" and animal experiments in which the deposition in living tissues of the deadly war gases, mustard and lewisite, was traced with radioactive substances, have been revealed at the University of California

The experiments were done during the war to learn more about the action of these gases Dorothy Axelrod, research assistant, and Dr Joseph G Hamilton, associate professor of medical physics, reported the work in the American Journal of Pathology (May)

In the experiments, a tiny section of skin was painted over with mustard gas "tagged" with radioactive sulfur or lewisite "tagged" with radioactive arsenic Thin slices of biopsied skin taken after administration were placed on a photographic plate, the radioactivity exposing the film

From these radioautographs, Miss Axelrod and Dr Hamilton were able to determine in what tissues and types of cells the two gases were found to concentrate

Lewisite was deposited in the outer layer of the skin, the hair follicles and hair Very little penetrated to the deeper layers of skin, but it was very destruction to cells wherever it lodged

Mustard gas proved much more penetrating, going primarily into the under layer of skin, thus possibly explaining the deep burns found in exposure to this gas

An accumulation of both materials was found in and around blood vessels

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✿ *JELMETER is a simple device for home use to indicate the amount of natural pectin in fruit juices and the amount of sugar needed for jelling. A glass tube, with a small bottom outlet, is filled with the juice which is permitted to drip for one minute. A line on the glass at the top of the remaining juice shows the amount of sugar needed.*

Science News Letter, June 28, 1947

✿ *FISHLINE SINKER made of metal has a removable center between two end parts; the center portion, which tapers toward its ends, can be replaced by one with a greater diameter and weight. Slotted lengthwise, it can be removed and the replacement added without tools.*

Science News Letter, June 28, 1947

✿ *BEVERAGE bottle carrier grasps six bottles by their necks and has a centered handle for carrying. The device is made of plastic with six openings to slide over the bottle necks and two hinged clamps to hold them tightly in place.*

Science News Letter, June 28, 1947

✿ *VENTILATED umbrella for use on the lawn is made of overlapping strips of light aluminum that keep out the sun but allow air circulation. The picture shows its sturdy construction and that it can be tilted as needed. The umbrella is made in eight sections to permit easy dismantling and compact storage.*

Science News Letter, June 28, 1947

✿ *PAIL COVER, to keep contents either hot or cold, is made of glass fiber and a plastic and has a braided drawstring to gather in the upper edges. A removable basket of the same material fits the top of the pail. The cover is designed for a 10-quart galvanized pail.*

Science News Letter, June 28, 1947

✿ *FIRE EXTINGUISHER, developed for aircraft cabin use but usable elsewhere for fires in upholstery and bedding, [illegible] an anti-freeze water solution propelled by carbon dioxide and works like the well-known seltzer bottle. The gas is carried compressed in cartridges similar to those used to inflate rubber life rafts.*

Science News Letter, June 28, 1947

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Question Box

AERONAUTICS

What is the main cause of plane crashes? p. 406

ASTRONOMY

What constellations can you see in the summer sky? p. 407

BIOLOGY

What metal [illegible]? p. 408

CHEMISTRY

How are the chemical fragments of artificial proteins linked up? p. 409

On what does rubber depend for its elasticity? p. 409

What [illegible] plane [illegible]? p. 401

MEDICINE

How [illegible] in its effect on the [illegible]? p. 411

How is a new [illegible] better for surface infections than [illegible]? p. 402

ORNITHOLOGY

Do starlings prefer waltzes or marches? p. 410

PHYSICS

How are scientists developing plans for a rocket superior to the V-2? p. 405

Pictures: *Cover, U. S. Navy; Harvard University, p. 403; Solar Aircraft Co., p. 405; Wright Aeronautical Corp., p. 4 6*

Where published sources are used they are cited.